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A National Environmental/Energy Workforce Assessment

CALIFORNIA

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This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

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TABLE OF CONTENTS

Page

ILLUSTRATIONS iii

ACKNOWLEDGEMENT vii

PREFACE x

FOREWORD xi

STATE SUMMARY 1

STATE PROFILE 13

POLLUTION CONTROL AND ABATEMENT AGENCIES 17

POLLUTION CONTROL AND ABATEMENT PROGRAMS 19

- I. Air 20
- II. Noise 32
- III. Pesticides 45
- IV. Potable Water 59
- V. Radiation 68
- VI. Solid Waste 80
- VII. Wastewater 101
- VIII. Energy 118

SELECTED POST SECONDARY INSTITUTIONS WITH FORMAL ENVIRONMENTAL/ENERGY PROGRAMS 138

STATE LEGISLATION 146

NOTE: The Selected Bibliography is appended to each Regional Report.

ILLUSTRATIONS

Figure Page

1 Agricultural Chemicals and Feed Organizational Chart 58
2 Public Health Division Organizational Chart 79
3 State of California Existing Class 1 Disposal Sites 84
4 State of California Existing Calss II-1 Disposal Sites 91
5 California Solid Waste Management Board Organizational Chart 100
6 Water Resources Control Board Organizational Chart 117
7 Energy Resources Conservation and Development Commission Organizational Chart 137

Table

I Air Resources Board Current (1976) Staffing Level 22
II State of California Local Air Pollution Control Agencies Current (1976) Staffing Level 24
III Air Resources Board Workforce Projections to 1982 27
IV State of California Local Air Pollution Control Agencies Workforce Projections to 1982 28
V California Department of Transportation Environmental-Chemical Branch Air Section Current (1976) Staffing Level 36
VI California Department of Transportation Aeronautic Division Current (1976) Staffing Level 37

Table		Page
VII	California Municipal Noise Ordinances	39
VIII	California Department of Food and Agriculture Agricultural Chemicals and Feed Division Current (1976) Staffing Level	47
IX	California Department of Food and Agriculture Agricultural Chemicals and Feed Division Workforce Projections to 1982	51
X	California Department of Health Sanitary Engineering Section Current (1976) Staffing Level	60
XI	State of California Certified Water Treatment Plant Operators (1976)	61
XII	State of California Los Angeles Department of Water and Power Water Supply Related Workforce Current (1976) Staffing Level	63
XIII	California Department of Health Radiologic Health Section Current (1976) Staffing Level	69
XIV	Community Health Services Bureau of Occupational and Radiation Management Current (1976) Staffing Level	70
XV	State of California Nuclear Related Technician Workforce Current Estimate (1976)	72
XVI	State of California Nuclear Related Technician Workforce Workforce Projection (1977)	74
XVII	California Solid Waste Management Board Current (1976) Staffing Level	82
XVIII	State of California Existing Class 1 Disposal Sites	85
XIX	State of California Existing Class II-Disposal Sites	87

Table		Page
XX	State of California Estimated Production of Environmental Dangerous Wastes by County	92
XXI	California Solid Waste Management Board Workforce Projections to 1982	96
XXII	California State Water Resources Control Board Staffing Level (1976)	103
XXIII	California State Water Resources Control Board Staffing by Branch (1976) est.	104
XXIV	State of California Section 208 Planning Agencies Staffing Level (1976)	105
XXV	California State Water Resources Control Board Workforce Projections to 1982	109
XXVI	State of California Municipal Wastewater Treatment Plant Operators Workforce Projections to 1982	111
XXVII	Energy Resources Conservation and Development Commission Administrative Offices Current (1977) Staffing Level	125
XXVIII	Energy Resources Conservation and Development Commission Program Divisions Current (1977) Staffing Level	126
XXIX	Energy Resources Conservation and Development Commission Division of Administrative Services Current (1977) Staffing Level	127
XXX	Energy Resources Conservation and Development Commission Alternative Implementation Division Current (1977) Staffing Level	128
XXXI	Energy Resources Conservation and Development Commission Energy Facilities Siting Division Current (1977) Staffing Level	128

Table		Page
XXXII	Energy Resources Conservation and Development Commission Conservation Division Current (1977) Staffing Level	129
XXXIII	Energy Resources Conservation and Development Commission Energy Assessment Division Current (1977) Staffing Level	129
XXXIV	Pacific Gas and Electric Company Environmentally Related Staff Current (1976) Staffing Level	132

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PREFACE

This study provides information on existing workforce levels, training programs, and career potentials and develops workforce projections (1976-1982) for the environmental pollution control fields of air, noise, pesticides, potable water, radiation, solid waste, wastewater, and energy conservation/conversion in the State of California. The profiles and projections contained in this report are based upon available information obtained through various state agencies. The information and data presented in this study were obtained through extensive personal interviews with professionals working in the respective fields. The personal interviews were supplemented with information collected through telephone surveys and research.

This study was conducted under the direction of the United States Environmental Protection Agency by National Field Research Center, Inc., located in Iowa City, Iowa.

FOREWORD

The materials contained in this report include information and data collected for eight individual pollution control inventories conducted for California. The format includes workforce profiles, projections and career potential for each of the areas investigated. Projections were necessarily based on best professional estimates obtained through available information. The pollution control areas considered by this study are as follows:

Air
Noise
Pesticides
Potable Water
Radiation
Solid Waste
Wastewater
Energy

National Environmental Energy Workforce Assessment

Phase I

CALIFORNIA

State Summary

I. AIR

The California Air Resources Board is responsible for the control of vehicle emissions and for a coordinated state and local program of air pollution control. The Board is currently staffed with 405 persons: 34 administrators, 126 engineers, 2 attorneys, 41 scientists, 63 technicians, 81 other, and 58 clerical. The Board anticipates some growth during the next five years, with an average annual increase of 8 percent.

There are a total of forty-one local air pollution control boards staffed and operating in California. The boards are currently staffed with 941 persons. This number includes engineers, inspectors, attorneys, sanitarians, technicians, chemists, data processing specialists, public information specialists, pollution control specialists, meteorologists, instrumentation specialists, and others. The local air pollution control agencies predict steady but limited growth in staff requirements during the next five years, with an average annual increase of 2 percent.

Limited information is available on the private sector. There are 1,637 major installations in the state; it has been predicted that most of these installations have air pollution control components, however, no staffing estimates are available. Private industry predicts from 1 to 2 percent per annum growth during the next five years.

II. NOISE

The California Office of Noise Control maintains primary responsibility for noise pollution control and abatement regulatory functions; however, other agencies involved in noise control include the State Highway Patrol, the State Housing and Community Development Commission, the California Department of Transportation, and the Attorney General's Office.

The Office is currently staffed with five professional and two clerical positions. The professionals include three engineers, one architect, and one psychoacoustician. The Office predicts that staffing requirements for the program will approximately double by 1981, with a minimum of three professional positions.

The other agencies involved in noise control employ approximately 238 professionals. The professionals have backgrounds and experience as highway patrol officers, engineers, chemists, sanitarians, statisticians, compliance specialists, planners, engineering technicians, and aviation specialists. Growth in the agencies will be minimal during the next five years.

Within the private sector, there are approximately 175 to 200 persons involved with aspects of noise programs within the counties and municipalities. Occupations include engineers, industrial hygienists, police officers, field inspectors, and consultants. Minimal growth is anticipated in the private sector.

III. PESTICIDES

The California Department of Food and Agriculture is the principal pesticide regulatory and control unit in the state. Two administrative units within the department have pesticide related programs: the Agricultural Chemicals and Feed Division and Pesticide Residue Laboratory. The Agricultural Chemicals and Feed Division is currently staffed with 84 persons: 48 in state headquarters and 36 in district offices. Most positions are filled by persons with backgrounds in chemistry, entomology, plant pathology, agricultural education, and biology. The Pesticide Residue Laboratory is staffed with 14 chemists.

Other state agencies involved with pesticide programming include the Pesticide Investigation Laboratory, the California State Extension Service, and the Pesticide Education Coordinating Unit. These agencies employ an additional 159 persons who have some responsibility for pesticide programs. Limited growth is anticipated in these state agencies during the next five years.

In addition to the above staff, there are 192 part-time county agricultural extension specialists, 7,000 commercial applicators/operators, 700 agricultural pest control advisors, and 65,000 farmers. Substantial growth is anticipated for the private sector. Experts within the area indicate that there may be as much as 5 to 15% increase in the workforce requirements per annum during the next five years.

IV. POTABLE WATER

The Sanitary Engineering Section of the Department of Health has the administrative responsibilities for the potable water programs for the State of California. The Section is currently staffed with 68 persons: 57 professional/technical positions, 9 clerical positions, and 2 temporary workers. As a general rule, the professional have backgrounds in engineering. The staff devotes only 70 percent of their time to domestic water supply regulation. No growth is projected for the Section during the next five years.

The 53 county health departments have some responsibility for potable water programs. Workforce statistics for the departments are sketchy; however, it is estimated that each department has from one to five persons with some responsibility in water supply. No growth is projected for the next five years.

Little information is available on the private sector workforce. The Sanitary Engineering Section maintains records only on the number of certified system operators. There are 5,279 operators currently certified. A partial survey of water treatment facilities within the state revealed that the crew size and composition varied according to locality. The largest facility in the United States is the Department of Water and Power of the City of Los Angeles. The facility currently employs 10,454 persons. No growth is predicted in the private sector during the next five years.

V. RADIATION

The principal function of the Radiologic Health Section of the California Department of Health is the elimination of unnecessary and unproductive man-made radiation. The Section is currently staffed with 31 professional/technical positions and 22 clerical positions. The Section anticipates adding from five to six persons to the staff during the next five years. Three of the positions will be added to the X-ray inspection program, and two of the positions will be used to expand the X-ray licensing program.

The Bureau of Occupational and Radiation Management of the Community Health Services Agency in Los Angeles operates an environmental radiation satellite program. The program is staffed with nine professional/technical positions and three clerical positions. The Bureau predicts a maximum growth of two positions during the next five years: one radiation protection specialists and one health physicist.

Private sector workforce statistics are varied. A report published by ERDA on the nuclear related technician workforce indicated that 7,297 persons are involved in private sector occupations. In addition, the Radiologic Health Section indicates that there are approximately 156 health safety officers employed at clinics, 156 safety officers and assistants employed at academic institutions, 71 Civil Defense instructors, and an undetermined number of employees in the 805 industrial users. Statistics support a 5-10% per annum growth rate in the private sector through 1981.

VI. SOLID WASTE

The Solid Waste Management Board, the state lead agency for solid waste related programs, is currently staffed with thirty-five professional/technical positions: 9 engineers, 6 administrators, 6 solid waste specialists, 4 resource economists, 2 planners, and 8 student assistants. The majority of the professionals have training in engineering, physical science, or economics. Activities of the Board are supported through the efforts of 10 clerical employees.

The Solid Waste Management Board anticipates major growth in its staff during the coming five years. During 1977, the Board predicts a 100% increase in staff, and from 1977 to 1982, the Board estimates an annual average growth rate of 27%. This rapid growth is related to the Board's increased program responsibilities under the emerging resource recovery program and the technical assistance program to the counties.

No information is currently available on the number of employees working in the sanitary landfills, hazardous waste sites, or collection systems. Moderate growth is predicted within the private sector during the next five years. The exact amount of annual growth cannot be accurately determined. Any increase will be directly related to population growth and industrial expansion.

VII. WASTEWATER

The environmental wastewater regulatory agency for the State of California is the State Water Resources Control Board. The Board employs a total of 496 professional/technical positions and 190 clerical positions. Professional occupations include 65 administrators, 54 biologists, 278 engineers, 30 engineering technicians, 53 analysts, 15 attorneys, and 1 operations specialist. The Board expects only limited growth during the next five years, with an average annual increase of no more than 1 percent.

Other state and regional agencies involved with wastewater programs include the California Department of Fish and Games Laboratory, the Marine Bio Assay Laboratory, the San Marcos Training Center, five community colleges, and seven regional planning commissions. Cumulatively, they employ an estimated 167 persons in wastewater related programs. Minimal growth is projected through 1981.

There are approximately 735 municipal wastewater treatment plants in the state that employ an estimated 7,655 persons. This includes 4,000 operators and 3,655 others. The other category consists of administrators, chemists, and maintenance persons. During the next five years, an average annual growth of 5 percent is predicted. In addition, there are 750 individual plants in the state, 250 of which operate waste treatment facilities. The crew size in the facilities range from two to three persons. An average annual growth of from 5 to 10 percent is predicted for the industrial wastewater program.

VIII. ENERGY

The California State Energy Resources Conservation and Development Commission is the principal energy program coordinating agency for the state. The commission is staffed with a total of 573 persons including administrators, scientists, economists, lawyers, and planners. During the next five years, the commission does not anticipate any major growth in its staffing requirements.

Each of the utility companies in the state has an environmental workforce; however, complete information on the extent of this workforce is not currently available. Data were, nevertheless, collected on two of the state's major utilities: Southern California Edison Company and the Pacific Gas and Electric Company. Pacific Gas was able to identify 165 persons with direct environmental responsibilities. Sources at the company indicated that an undetermined number of persons provide additional supportive services to the environmental effort. Southern California Edison has an environmental component under its Environmental Planning Department. The Department is staffed with 21 full-time persons. Additional support is provided through a minimum of four other departments in the company. No estimate was available on the number of persons involved in environmental activities within these departments.

While the public sector workforce is predicted to remain reasonably stable, major growth is projected for the private sector during the next five years. The exact amount of growth cannot be accurately determined at present.

STATE OF CALIFORNIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	1346	1440	1492	1538	1585	1633	4%
NOISE[1]	238	247	247	247	247	252	1%
PESTICIDES[2]	237	245	253	261	269	280	3%
POTABLE WATER[3]	5347	5347	5347	5347	5347	5347	0%
RADIATION	7720	8450	9238	10100	11044	12078	9%
SOLID WASTE[4]	35	70	76	84	91	98	27%
WASTEWATER[5]	8151	8345	8943	9339	9738	10136	4%
ENERGY[6]	573	573	573	573	573	573	0%
TOTALS	23647	24717	26169	27489	28894	30397	5%

[1] Figures include projections for public sector only; they do not include the 175-200 private sector employees.

[2] These estimates do not include the estimated 192 part-time extension agricultural farm advisors, the instructional staff at commercial colleges who may become involved in pesticide training, the 7,000 commercial applicators/operators, 700 agricultural pest control advisors, 65,000 farmers, or the 18-25 seasonal employers at the Pesticide Investigation Laboratory.

[3] These figures include only state staff and number of certified operators. They do not include operators at municipal systems, or the employees of the 53 local health departments who have potable water related tasks.

[4] The above does not include private sector workforce statistics.

[5] The above does not include persons employed or contracted under 208 Planning in Regional Planning Commissions, the 12 professionals at the California Fish and Games Laboratory, 21 employed at the Marine Bio Assay Laboratory, 5 employees at the San Marcos Training Center, 9 instructors at community colleges, and the undetermined number of employees at the 250 industrial wastewater treatment facilities.

[6] The above includes information on the state lead agency only. The growth was calculated on a simple percentage basis.

EDUCATION

Environmental education programs are offered in numerous state universities, colleges, community colleges, and technical schools. Advanced degree programs are offered through the University of California at Berkeley, the University of California at Irvine, California State University at Sacramento, California State University at San Jose, and Stanford University.

Advanced degrees in Environmental Engineering are available through the University of California, Irvine; California State University, San Jose; and Stanford University. The University of California at Berkeley offers both masters and doctoral degrees in Sanitary Engineering. A Masters of Science in Engineering degree is awarded by the California State University, Sacramento, for course work in Civil Engineering with an environmental emphasis.

The California State Water Resources Control Board operates a comprehensive wastewater treatment training program through the San Marcos Training Center. The Center currently offers fifty courses; however, not all courses are available during a given quarter.

Wastewater and potable water operator training programs are also available through five community colleges in the state: Orange Coast, Santa Ana, Contra Costa, Sacramento City, and Sierra. Others of the 106 state community colleges offer sporadic environmental training programs; however, minimal information is currently available on these programs.

LEGISLATION

The environmental/energy legislation for California was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Quality Act of 1970
Air Pollution Control Laws
Motor Vehicle Code Air Pollution Provisions
Pollution Control Financing Authority Act
Noise Control Act of 1973
Pest Control Operations-Agricultural Code
Water Systems and Operators Law
Radiation Control Law
Hazardous Waste Law
Beverage Container Law
Solid Waste Management and Resource Recovery Act
Porter-Colgne Water Quality Control Act
Coastal Zone Conservation Act of 1972

National Environmental Energy Workforce Assessment

Phase I

CALIFORNIA

State Report

13

STATE PROFILE

California is perhaps the state to which more superlatives apply than any other. In terms of population, economic resources, cultural attractions, and scenic wonders it is more easily compared with other nations than with other states.

With a population of over 20 million, California is the most populous state in the nation. Most of the population is urban and resides in coastal cities; foremost among these are Los Angeles, San Francisco, and San Diego. Following the discovery of gold in the state in 1848, a steady stream of immigrants has flowed into the state bringing with them a variety of racial, religious and cultural backgounds. The state nearly doubled in population every 20 years from 1860 to 1960. California is now the home of major Chinese, Japanese, Black and Chicano populations.

The economic resources of California are vast and diversified. Its gross product is larger than any other state and, in fact, is exceeded by only five nations in the world --- the United States, Soviet Union, West Germany, France and Japan; the per capita income is larger than that of any other country.

California is the principal agricultural state in the nation. There are more than 8,000,000 acres of irrigated farmland in the state, and it ranks first in the production of grapes, tomatoes, sugar beets, strawberries, beef cattle and turkeys. One-third of the nation's canned and frozen fruits and vegetables originate in California; 80 percent of the wine consumed in the United States is produced in the state. Farms are typically large and specialize in one or two crops resulting in what amounts to an agricultural assembly line. A nine to ten month growing season has expanded the state's agricultural production.

California has been and continues to be a leader in petroleum production although reserves are rapidly being depleted. Natural gas, cement, sand and gravel are other important mineral resources. Fisheries and forestry are other significant commercial activities; tuna is the primary catch.

The aerospace industry, aircraft plants and shipyards are other key segments of the California economy. These facilities developed during World War II and have grown and been supplemented since then by research and development funding. Film and television, tourism, and military installations are the other primary contributors to the economy.

The diversity of the California landscape represents one of the major attractions of the state. The Coastal ranges and the Sierra Nevada contain some of the highest peaks and most beautiful scenery in the country. Death Valley, redwood forests, and numerous national parks are among the state's physical features.

California's water resources have had a major impact on its economy and environment. The southern part of the state contains 60% of the population but has only 2% of the water. A complex system of dams and aqueducts moves water from the north to the south. The California State Water Project was launched in 1960 and is the largest water transfer system undertaken in history. Facilities to move an additional 1.8 billion gallons daily are still incomplete.

The coastal area of California has developed into the second most urban area in the United States. An environmental, economic, and social outgrowth of this population is that California has the greatest concentration of motor vehicles on earth; it also has the most extensive system of multilane divided freeways. Smog and congestion have resulted from 14,000,000 registered motor vehicles and nearly 4,000 miles of freeways. Not insignificant in terms of air pollution is the San Francisco -- Los Angeles -- San Diego air corridor, the most heavily-travelled route in the country.

California state government has shown many innovations, perhaps partially due to the variety in population backgrounds. Referendum, recall and direct constitutional amendment are all a part of California's law. California is recognized as a leading state in education, health and welfare, and cultural matters.

Many developments in California's history have been innovative in such areas as life-styles, economic growth, and population expansion. As a result of these rapid changes, California has had to face and solve unique problems. It has been a leader in attempts to abate air pollution through control of motor vehicle emissions. Water projects to serve the large population have had major ecological impacts. While indications are that population growth has leveled off, California will continue to have, and solve, environmental problems.

CALIFORNIA POLLUTION CONTROL AND ABATEMENT AGENCIES

The Resources Agency constitutes California State's lead agency in pollution control regulation and abatement. It is comprised of the following departments: Conservation, Fish and Game, Navigation and Ocean Development, Parks and Recreation, Water Resources, State Water Resources Control Board, Solid Waste Management Board, the Reclamation Board, the Air Resources Board, the nine Regional Water Quality Control Boards, the Colorado River Board, and the State Lands Commission. In addition, the San Francisco Bay Conservation and Development Commission has been administratively assigned to the Resources Agency by the Governor. The Agency is headed by the Secretary, a Governor appointee, who has the power of general supervision over, and is directly responsible to the Governor for, the operations of each department and unit within the agency. The Secretary develops and reports to the Governor on legislative, budgetary and administrative programs to accomplish comprehensive, long-range, coordinated planning and policy formulation in matters of public interest related to the agency.

Of those agencies under the umbrella of the Resources Agency, the following agencies have environmentally related activities: Fish and Game, Water Resources, State Water Resources Control Board, Solid Waste Management Board, Air Resources Board, and the nine Regional Water Quality Control Boards.

Other state agencies which are involved in environmental pollution control and abatement include: California Department of Transportation, Attorney General's Office, Office of Noise Control Pesticide Investigation Laboratory, Marine Bio Assay Laboratory, Department of Food and Agriculture, Office of Planning and Research, Department of Health, Energy Resources Conservation and Development Commission, State Highway Patrol, and the Office of Pesticide Applicator Training.

Much of the pollution control and abatement activities within the state have been decentralized. Among the regional and local agencies and organizations which have operable environmental programs are: the regional planning commissions, the county departments of health, the county building commissions, the local air pollution control districts, municipal police departments, and the municipal water and wastewater treatment facilities.

Notable priorities of current importance include 208 Planning and Construction Grants for water programs, resource recovery and solid waste management techniques for the solid waste area, and statewide inventory of sources of air pollution.

Pollution Control and Abatement Programs

I. AIR

A. Introduction

The Air Resources Board is the air pollution control agency of the State of California. The Board is responsible for the control of vehicle emissions and for a coordinated state and local program of air pollution control. The Board maintains a surveillance of air quality and statewide inventory of sources of air pollution; adopts standards and test procedures for emissions for motor vehicles; and approves motor vehicle emission control systems. The Board also reviews the regulations and programs of local agencies for the control of nonvehicular sources of air pollution, and sets and enforces regulations where local agencies fail to do so.

The first enabling legislation for air pollution control was adopted in 1947 (it allowed counties to set up control plans). In 1955, a state level agency (The Bureau of Air Sanitation) was formed to assist the counties. In 1959, the first statewide ambient air quality standards and motor vehicle emission standards were adopted. In 1969, the present Air Resources Board was formed and greater powers were allocated to the local air pollution control agencies. The basic goals of the Air Pollution Control Board include the following:

1) air monitoring to determine the extent to which air quality standards are met;

2) design and enforcement (direct or through counties) of emission control programs to attain the air quality standards where they are not met and to preserve high grade air quality in the other areas;

3) assisting state and local planning efforts to incorporate air quality considerations into their long range planning processes (e.g., for land use, services, etc.).

The activities of the Board include:

1) setting air quality standards for the state;
2) setting motor vehicle standards for the state;
3) enforcing motor vehicle standards;
4) maintaining the statewide air quality monitoring and source emissions inventory systems;
5) overseeing the operations of the local air pollution control districts;
6) conducting enforcement actions for the local districts when they cannot or will not do so;
7) administering the regulation of agricultural burning program;
8) administering the program for direct financial assistance to local air pollution control districts;
9) providing technical consultant services and assistance to local air pollution control districts;
10) conducting research programs focusing on land use policies and methods and techniques of control of air pollution;
11) designing equipment for controlling the impact of hydrocarbons from handling of gasoline.

The administration and operation of these program activities are accomplished through the seven program divisions: Administrative Services, Legal Affairs and Enforcement, Research, Stationary Source Control, Technical Services, Vehicle Emission Control and Planning.

The Board was reorganized toward the end of 1976, and the administrative responsibilities vested in these seven newly created divisions.

B. Workforce Profile

The Air Resources Board has experienced a steady growth in staffing since 1969. The Board has grown from a staff of 123 in 1969, to 405 persons in 1976. This represents a cumulative growth of 229 percent. Although staff positions vary somewhat, the following table represents the Board's current staffing configurations:

TABLE I

AIR RESOURCES BOARD

Current (1976) Staffing Level

Position	1976
Administrator	34
Engineer	126
Attorney	2
Scientist	41
Technician	63
Clerical	58
Other*	81
TOTAL	405

*"Other" includes such classifications as programmers, draftsmen, laborors, librarians, etc.

Turnover in the Board averages 5 percent per annum. This turnover is considered average and accounts for persons seeking better paying jobs or career advancement in other agencies and programs. As position vacancies occur, the Board recruits new employees through a variety of methods: personal contacts, on a "walk-in" basis, and through the state Civil Service Commission.

A total of forty-one local air pollution control boards are staffed and operating within California. The local agencies are designated according to standard metropolitan statistical areas, population growth, industrialization, and level of ambient air contaminants. The local agencies are currently staffed with 941 professional/technical and 129 clerical positions. The local air pollution control agencies have somewhat stabilized in staff growth during the past two years. The following table depicts the staffing configurations for the local air pollution control agency by occupational type.

TABLE II

STATE OF CALIFORNIA

Local Air Pollution Control Agencies
Current (1976) Staffing Level

Position	1976
Administrator	106
Engineer	193
Inspector	236
Attorney	28
Sanitarian	62
Technical	90
Chemist	50
Data Processing Specialist	31
Public Information Specialist	16
Pollution Control Specialist	22
Meteorologist	11
Instrumentation Specialist	23
Other	73
TOTAL	941

The other category includes smog episode clerks, environmental management specialists, C.E.T.A specialists, statisticians, planners, maintenance workers, communications officers, mechanics, programmers, and librarians.

Turnover within the local agencies varies according to agency; however, the average rate appears to be from 5-15% annually. This turnover rate is considered moderate, and is attributed to general interest in the job and benefits. In addition, most employees have solid upward mobility opportunties within both the private and public sector. Consequently, some of the turnover is related to promotional opportunities.

As position vacancies occur, a variety of methods are used to fill these vacancies: internal promotion, advertisements in professional journals, referral from professional organizations, and interviews at colleges and universities. In a number of instances, the agencies will accept applications from individuals on a "walk-in" basis.

In an effort to assess the workforce situation in the private sector, a variety of techniques have been utilized. Representatives from the Air Resources Board and staff members of the local air pollution control districts were interviewed and asked to estimate the number of persons involved in air pollution control and abatement activities within their respective jurisdictions. In addition, these projections were supplemented with information provided through on-site interviews and telephone conversations with selected private industries and utilities in the state.

There are 1,637 major installations in the state which emit over 100 tons of pollutants each year. It has been estimated that each of these installations have an air pollution control crew which varies in size and composition, with the smallest being one part-time engineer. The average crew size would appear to be one engineer, one part-time attorney, and a corps of one or more technicians.

The turnover rate for private industry is difficult to assess. Experts in the state indicate that turnover within private industry tends to be minimal. This factor is attributable to good salaries and employee benefits within the private sector. Further, it is projected that most of these positions have relatively high seniority rating, and consequently, turnover is more frequently related to retirement.

As position vacancies occur within private industry, personnel recruitment methods similar to those used by the state and local air pollution control agencies are utilized. Among the methods used are: advertising in state and local newspapers, placing notices in professional journals, requesting referrals from professional societies and organizations, and through personal contacts. Private industry does not consistently recruit new employees through colleges and universities, since they prefer professionals with experience.

C. Workforce Projections

The Air Resources Board projects fairly substantial increases in staff requirements during the next five years. These increases have been attributed to meeting the goals set forth by the Board. The following table provides a breakdown, by position, of the workforce projections to 1982.

The average percentage figures were calculated by using the year-by-year percent change, then totaling and averaging those numbers to obtain a five-year average. All subsequent figures will be calculated in the same manner.

TABLE III

AIR RESOURCES BOARD

Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum average (average)
Administrators	34	40	43	45	47	49	5%	8%
Engineer	126	149	159	167	175	184	5%	8%
Attorney	2	3	3	4	4	4	5%	16%
Scientist	41	52	56	59	62	65	5%	8%
Technician	63	76	81	85	89	93	5%	8%
Clerical	58	69	74	78	82	86	5%	8%
Other	81	91	97	101	107	113	5%	7%
TOTAL	405	480	513	539	566	594	5%	8%

Any further change in the number of positions within the Board during the next five years will be a consequence of currently undefined enforcement duties or new air quality monitoring requirements. Further, it is anticipated that the adoption of the Clean Air Amendments would have an impact upon the staffing of the Board, but the degree and nature of the impact is as yet undefined.

The local air pollution control agencies predict steady, but limited growth in their agencies during the next five years. The average annual growth rate is approximately 2%. The major focus of the growth will be in the chemist, engineer, and meteorologist positions. There will also be some growth in the support staff; however, growth in the number of administrators and clerical positions will be less than one percent per annum. Based upon these projections for percent per annum growth, the following table represents the workforce projections for the local agencies to 1982.

TABLE IV

STATE OF CALIFORNIA

Local Air Pollution Control Agencies Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth/ decline (average)
Administrator	106	107	108	110	112	112	n/a	1%
Engineer	193	197	202	205	209	213	n/a	2%
Inspector	236	240	246	250	254	254	n/a	2%
Attorney	28	28	28	28	28	28	n/a	0
Sanitarian	62	63	64	65	66	67	n/a	2%
Technician	90	91	92	93	94	95	n/a	1%
Chemist	50	51	52	55	56	57	n/a	2%
Data Processing Specialist	31	32	35	36	37	37	n/a	4%
Public Information Specialist	16	16	16	17	17	17	n/a	1%
Pollution Control Specialist	22	22	22	22	22	22	n/a	0
Meteorologist	11	13	15	16	17	18	n/a	10%
Instrumentation Specialist	23	23	23	23	23	23	n/a	0
Other	73	70	63	58	48	47	n/a	-9%
TOTAL	941	953	961	983	983	990	5-15%	1%

The growth in the local air pollution agencies is directly related to expanded services under the existing programs. No new programs are planned, nor is consideration being given to diversification of existing programs.

Growth within the private sector is expected to correspond to the growth pattern of the state and local air pollution control agencies. Private industries indicated that there was a direct relationship between the enforcement and monitoring activities of the state and the program efforts of industry. Consequently, private industry predicts a growth of between one and two percent per annum during the next five years. The occupations experiencing the greatest growth will be in technical positions.

D. Training and Certification

The Air Resources Board offers a voluntary emission training program. The course, which is offered every two months, is held in six locations throughout the state. A concerted attempt is made by the Board to provide for maximum accessibility of the course.
The educational program consists of four full days of training. Approximately 25 persons participate in each course.

The California State Air Resources Board offers a basic orientation program for new employees. The program is supplemented by staff sharing efforts. The Board does not have a mandatory continuing education policy for employees; however, the Board does encourage individual development efforts.

E. Career Potential

For the State of California, career prospects within the air pollution control and abatement field appear to have stabilized. During the past five years, the state and local agencies have experienced substantial growth. However, without the passage of new federal or state legislation or regulations, there is no evidence to support a major workforce growth projection. There will be limited growth within the inspector, meteorologist, engineer, chemist, and data processing occupations. In most situations, however, position vacancies will occur as a result of turnover as opposed to creation of new positions.

Further, experts within the discipline indicate that passage of the Clean Air Amendments would have an impact upon staffing, but the extent and nature of such an impact are, to date, indeterminate. It is important to add that as yet undefined enforcement duties or new air quality monitoring requirements would have a significant impact upon both the private and public sector.

Information available on the public and private sectors indicate that as much as 90% of the specific skill training for both professional and technical personnel occurs on the job. On-the-job training most generally consists of an informal sharing of work methods and techniques with more experienced personnel. The training programs which are available through state universities, community colleges, and technical schools are not considered to offer the requisite degree of technical information. Additionally, there appears to be a noticeable discrepancy between the training and the on-the-job activities.

F. Conclusion

Two basic conclusions are apparent following a thorough review of the workforce projections for the air pollution control and abatement activities in the State of California:

1) that, even though, the workforce demands for personnel has somewhat stabilized as compared to the last five years, there will be a continual, though gradual, demand for qualified personnel at all levels within the air pollution control field;
2) that technically oriented training programs for both professionals and technical personnel are at a premium.

Experts within the field have indicated that there is a need for training programs in air pollution control occupational disciplines. Both private industry and the state and local agencies indicated a willingness to assist educational institutions with the development of such programs. Representatives from these agencies and industries reinforced the theory that educational institutions are better qualified for the development and ongoing implementation of such programs. However, they implied that such training programs of necessity should include input from potential employers.

II. NOISE

A. Introduction

The California Office of Noise Control, located in the State Department of Health, maintains primary responsibility for noise pollution control and abatement regulatory functions. To deal with the various sources of noise statewide, a number of agencies have been delegated enforcement responsibilities. Among the agencies involved in noise activities are: the State Highway Patrol, the State Housing and Community Development Commission, the California Department of Transportation, and the Attorney General's Office.

The major goal of the Office of Noise Control is to reduce the level of community noise. At its implementation in 1975, the Office was given the following responsibilities for achieving the principal goal:

1) to serve as a resource to other state agencies in design and operation of noise related programs and activities;

2) to coordinate on a statewide basis all noise programs;

3) to train state and local personnel in the principles and techniques of noise control;

4) to conduct noise research in fields where new information is required;

5) to provide technical assistance to communities and counties in design and operation of community noise programs.

The state requires that all counties submit, on an annual basis, general plans. The general plans include program strategies for development and operation of programs related to the following categories:

noise, land use, housing, circulation, open space, conservation, seismic safety, and scenic highways. These plans are reviewed by the Governor's Office of Planning and Research. As problems arise with individual noise programs, the Office of Planning and Research will contact the Office of Noise Control to secure assistance in reviewing the planning strategies with the goal of complying with state laws and regulations.

As expected, the State Highway Patrol is involved with noise control as it relates to motor vehicular noise. The method most commonly used by the Highway Patrol in enforcement of noise is issuing warning tickets and citations. During 1973, the Highway Patrol issued 113,000 road citings, 245,000 mechanical warnings, and 30,000 citations which resulted in court appearances. This method has proven to be the most effective method to date in controlling vehicular noise. The Highway Patrol is currently involved in implementing a program requiring muffler certification. This program, which will be coordinated through muffler manufacturers, is planned for implementation during 1977-1979.

The State Housing and Community Development Commission is involved with noise control only as it concerns enforcement of housing laws. The principal focus of the Commission's activities is upon insulation requirements in newly constructed buildings.

Two sections of the California Department of Transportation are involved with noise control activities: the Environmental-Chemical Branch of the Transportation Laboratory and the Aeronautics Division. The Aeronautics Division is charged with the responsibility for regulation of airport noise. The Division attempts to control noise through a pre-construction permit program. The Division reviews all plans for construction of new airports. The review consists of an evaluation of safety criteria and an analysis for possible conflicts with other air environmental regualtions. In addition to this review process, the Division administers a grant-in-aid program. The basic program provides loans for general aviation construction projects.

The Laboratory has six fundamental objectives:

1) to provide consultant and advisory services to the district transportation offices;
2) to develop methods and techniques for investigations and reports on environmental impacts;
3) to provide for centralized testing capabilities;
4) to review training and service programs to assure the quality of the environment;
5) to conduct transportation related research;
6) to promote interdisciplinary approaches to optimizing transportation services.

The Laboratory devotes a portion of its time to noise related activities; however, the exact person-year commitment specifically allocated to noise activities is unknown.

There are two sections of the Attorney General's Office, the Public Resource Section and the Environmental Programs Section, which have responsibilities in noise control. These two sections have authority for review of proposed noise related laws and regulations. In addition, the offices serve as state counsel in noise related litigation. Less than 1% of the Sections' staff time is allocated to noise related activities.

B. Workforce Profile

The State Office of Noise Control is staffed with five professional and two clerical positions. The five professional positions consist of two mechanical engineers, one civil engineer, one architect, and one psychoacoustician. The civil engineer is responsible for studies and programs relating to freeway noise, the architect is involved with programs relating to acoustical abatement in housing, and the psychoacoustician is pursuing research on human noise tolerance standards. Turnover in the Office, since its opening in 1975, has been nil. Position vacancies are filled through personal contacts and referrals from professional organizations.

The State Office of the Highway Patrol allocates approxiamtely 1.2 to 1.7 person-years to noise administration. Two-thirds of the time is contributed by an engineer and one-third of the time is provided by clerical staff. The Highway Patrol also has a field staff of 12 highway patrol officers who perform the actual highway noise monitoring. The patrol officers commonly work in teams of two officers. Turnover within these teams is minimal. The low turnover is considered as a function of the recency of program implementation, and general job satisfaction. Patrol officers are recruited through the Highway Patrol training academy, and engineers are selected through the Civil Service System.

The Air Section of the Environmental-Chemical Branch of the Department of Transportation is charged with the noise related responsibilities. The Air Section has thirty-four staff members. The following table represents a breakdown of staffing by occupation type.

TABLE V

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Environmental-Chemical Branch
Air Section
Current (1976) Staffing Level

Position	1976
Engineer	17
Chemist	8
Sanitarian	1
Statistician	1
Compliance Specialist	2
Engineering Technician	5
TOTAL	34

Two of the engineers devote a major proportion of their time to noise programs. The engineers have backgrounds and training in civil engineering.

There are 11 district offices which have a staffing of approximately 100 persons. These persons represent varied backgounds in engineering, architecture, history, geography, biology, and engineering technology. A part of their time is allocated to noise activities, although no specific figures are available.

Turnover within the Environmental-Chemical Branch has been high during the past fiscal year. The Air Section has had a 90% turnover in staffing. This was the consequence of a total departmental reogranization. Under normal circumstances the turnover for the section averages 0-5% per annum. As position vacancies occur, the Branch recruits through the State Civil Service System.

The Aeronautics Divison is staffed with 22 positions: 14 professional and 8 clerical positions. The following table presents the staffing configuration by occupational type:

TABLE VI

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Aeronautic Division
Current (1976) Staffing Level

Position	1976
Administrator	2
Fiscal Officer	2
Engineer	2
Planner	2
Aviation Consultant	5
Other	1
TOTAL	14

The other position is a staff services analyst. Turnover within the Division averages less than 10% annually. The Division relies on internal promotions to fill position vacancies. The Civil Service System is used to fill positions when persons within the department are not available.

The Public Resources Section of the Attorney General's Office employs 37 attorneys, and the Environmental Programs Section is staffed by 35 lawyers. Turnover within these two sections averages around 10% annually. Positions are generally filled through the Civil Service System. There is no scarcity of applicants for available positions. There are an estimated 400 applicants for every available vacancy.

Due to the state law which requires counties to submit general plans for dealing with noise problems, each county has a noise control program. The December, 1975, issue of Sound and Vibration provided the following analysis of municipal noise ordinances.

TABLE VII

CALIFORNIA MUNICIPAL NOISE ORDINANCES

City	Nuisance	Zoning	Vehicle	Aircraft	Building	Construction	Recreational Vehicle	Railroad
Alhambra	X	-	-	-	-	-	-	-
Anaheim	X	X	X	-	X	X	-	-
Arcadia	X	-	-	-	-	-	-	-
Berkeley	0	-	-	-	-	-	-	-
Beverly Hills	X	-	X	-	X	X	-	-
Buena Park	X	X	-	-	-	-	-	-
Burbank	X	X	0	-	-	0	0	-
Chico	X	-	-	-	-	X	-	-
Costa Mesa	X	X	X	X	-	X	-	-
Cotati	X	X	-	-	-	-	-	-
Cupertino	0	-	-	-	-	-	-	-
Downey	X	-	X	-	-	0	X	-
El Cajon	-	X	-	-	-	-	-	-
El Segundo	X	X	0	-	-	0	-	-
Escalon	X	-	X	-	-	-	X	-
Fountain Valley	X	X	-	-	-	X	-	-
Fresno	X	X	-	-	-	X	-	-
Fremont	-	X	0	-	-	-	-	-
Gardena	X	X	X	-	X	X	X	-
Garden Grove	-	-	-	-	0	-	-	-
Glendale	X	X	0	-	-	0	-	-
Glendora	X	X	0	-	-	0	-	-
Hayward	0	-	-	X	X	-	-	-
Hemet	0	X	-	-	-	-	-	-
Hermosa Beach	0	X	0	-	X	-	-	X
Inglewood	X	X	-	X	-	-	-	X
Larkspur	X	-	X	-	-	-	X	-
Lakewood	0	X	-	X	-	X	-	X
Lodi	-	X	-	-	-	-	-	X
Lomita	X	X	-	-	-	-	-	-
Long Beach	X	-	X	X	-	X	-	-
Los Altos Hills	-	X	0	-	X	-	-	-
Los Angeles	0	X	X	-	X	0	-	-
Los Banos	X	-	X	-	-	-	X	-
Lynwood	-	X	0	-	-	-	-	-
Manteca	-	X	-	-	-	-	-	-
Menlo Park	0	-	-	-	-	-	-	-
Monterey	X	X	-	-	-	-	-	-
Newark	X	X	-	-	-	-	-	-
Newport Beach	X	-	X	-	-	-	X	-

TABLE VII

(continued)

City	Nuisance	Zoning	Vehicle	Aircraft	Building	Construction	Recreational Vehicle	Railroad
Navato	X	-	X	X	-	X	X	-
Oakland	0	X	-	-	-	-	-	-
Orange	X	X	-	-	-	X	-	-
Pacifica	0	-	-	-	-	-	-	-
Palo Alto	X	X	-	-	-	-	-	-
Pasadena	X	X	0	-	-	X	-	-
Pleasant Hill	X	-	X	-	-	0	-	-
Redding	X	-	X	-	-	-	X	-
Red Bluff	0	-	-	-	-	-	-	-
Richmond	-	X	X	X	-	-	-	X
Ross	X	-	X	-	-	-	X	-
Sacramento	0	-	-	-	-	-	-	-
Salinas	0	-	0	-	-	-	0	-
San Anselmo	X	X	X	-	-	-	-	-
San Bernardino	0	-	-	-	-	-	-	-
San Clemente	0	-	-	-	-	-	-	-
San Diego	X	X	X	-	X	X	X	-
San Francisco	X	X	X	-	-	X	X	-
San Marcos	X	-	X	-	-	-	X	-
San Jose	-	-	-	0	-	-	-	-
San Leandro	0	-	-	-	-	-	-	-
San Mateo	0	X	-	-	X	-	-	-
San Rafael	0	-	-	-	-	-	-	-
Santa Barbara	0	X	-	X	-	-	-	-
Santa Clara	0	X	-	-	-	-	-	-
Santa Fe Springs	-	X	-	-	-	-	-	-
Santa Maria	-	X	-	-	-	-	-	-
Santa Monica	-	-	-	0	-	-	-	-
Santa Rosa	X	X	X	-	-	-	-	-
Sausalito	X	-	0	-	-	-	-	-
Simi Valley	X	-	-	-	-	-	-	-
South El Monte	X	-	-	-	-	-	-	-
South Gate	X	-	-	-	-	-	-	-
Sunny Vale	0	X	-	-	-	-	-	-
Tracy	-	X	-	-	X	-	-	-
Torrance	X	X	X	-	-	0	-	-
Victorville	0	-	-	-	-	-	-	-

Key: X - Regulations including acoustical criteria
0 - Regulations not including acoustical criteria

(Chart excerpted from Sound and Vibration, December, 1975. Clifford R. Bragdon, Contributing Editor.)

The noise programs in the larger counties and municipalities generally represent a cooperative enforcement effort of the County Department of Health, County Building Commission, and the Police Department. In the smaller programs, the noise activities are most frequently coordinated through either the Police Department of the County Department of Health. It is estimated that there are between 175 and 200 persons involved with noise programs within the counties and municipalities. Occupations include engineers, industrial hygienists, police officers, field inspectors, and acoustical consultants.

Within the industrial sector there are a number of acoustical consultants, however, no figures are available on the number of consultants practicing in the state.

C. Workforce Projections

The State Office of Noise Control expects to double the staff by 1982. The Office will be requesting three engineers, one architect, and one psychoacoustician. No time frames have been established for adding these positions, and timing of the staff increase will be totally dependent upon available funding. The increase in staff is required as a consequence of growing demands for existing services. It is further predicted that the Office will expand its research component.

The State Highway Patrol is expanding its field staff from 12 persons to 21 persons during 1977. The total increase will be in the patrol officer category. The expansion in the field staff will result in more frequent monitoring of highway noise levels. No staff increase is being considered following the 1977 growth. The state administrative office will maintain its current level of effort, 1.2-1.7 person-years/annum, during the next five years.

The Air Section of the Environmental-Chemical Branch of the Department of Transporation does not anticipate any expansion in existing program activities nor implementation of new programs. Consequently, there will be no increase in staff during the next five years.

The Aeronautics Division of the Department of Transportation is considering becoming involved in air carrier matters. Such involvement would create a staff position for a planner. The Division also predicts an increase in environmental noise activities. As this aspect of the program grows, the Division will add an acoustical engineer. No specific year has been defined for adding these positions. No other growth is predicted for the next five years.

Neither the Public Resources Section nor the Environmental Programs Section of the Attorney General's Office predicts growth in staffing during the next five years. The Sections have experienced limited growth during the last year, and it is expected that this growth will be satisfactory to respond to increased requests for program services.

Any figures provided for growth within the private sector would be purely speculative. However, experts indicated that the anticipated growth on the state level will affect the workforce requirements on the county, municipal, and industrial levels in a positive manner. It is further expected that there will be a growing demand for professionals and paraprofessionals with background and experience in acoustics.

D. Training and Certification

The State Office of Noise Control has sponsored training programs in cooperation with the University of California Extension Service. Courses have been offered in highway and aeronautical noise, general noise programming for local planning and health officials, and noise standards in building insulation. The courses in highway and aeronautical noise and the course for local planning and health officials are offered for 16 hours. The highway noise course is offered once during the year with an average enrollment of 75 participants. The local planning and health officials course is offered six times annually with a total enrollment of 75 persons. The local building inspectors course is 8 hours in length and is offered in five locations. Approximately 400 building inspectors attend the courses annually. All three courses will be offered annually during the next five years.

E. Career Potential

The careers in the community/environmental noise field have been emerging during the past five years; the trend toward amplification and diversification in noise programs on both the state and local levels is expected to continue during the next five years. The growth is expected to be focused upon professional occupations with background in acoustics and engineering.

While most of the predicted growth for the next five years is apparently centralized within the state control agencies, it is anticipated that the growth in state programs will have a catalytic effect upon workforce requirements within the private sector.

F. Conclusion

Noise programs in the State of California have experienced steady growth over the past five years. This trend toward steady growth is expected to continue for the next five years. Experts in the field believe that of all environmental protection emphases, the area of noise has the greatest potential for resolution of problems. Technology is not currently available which would allow for the cleansing of the oceans, but technology does exist which can be used to control most aspects of environmental and community noise. Experts believe that, as more research is conducted upon the effects of noise levels upon human behavior and human tolerance, the public and the federal agencies will become aware of the pressing need for more stringent noise control programs. This awareness will serve as a catalyst in expanding federal and state noise enforcement and monitoring activities and community noise abatement programs.

III. PESTICIDES

A. Introduction

The Agricultural Chemicals and Feed Division of the California Department of Food and Agriculture is the principal pesticide regulation and control unit within the state. Until recently, the Division has been primarily concerned with product registration, product quality, and certification of agricultural pest control advisers and commercial applicators. Late in 1975, the Division assumed responsibility for the coordination of the private pesticide applicator certification program. Training for the private applicator program is being administered through the Office of Pesticide Applicator Training of the California Extension Service.

The Agricultural Chemicals and Feed Division has five basic enforcement activities within the pesticide control area. The include administration and enforcement of:

1) state pesticide use laws;
2) pesticide spray residue laws;
3) restricted pesticide materials laws;
4) feed and fertilizer laws;
5) worker safety programs.

In addition, the Division has coordinated the Commercial Applicator Licensing Program since 1948 and the Agricultural Pest Control Advisers Licensing Program since 1972. In California, the Commercial Applicator Licensing Program began on an individual county by county basis as early as 1916.

The California Agricultural Pest Control Adviser Licensing Program is considered unique. Under the regulations of this program an "agricultural pest control adviser means any person, who, as a requirement of, or indicental to his employment or occupation, offers a recommendation to a producer of an agricultural product or to any public or private agency concerning any agricultural use, or who holds himself forth as an authority or general adviser on any agricultural use to a producer of an agricultural product." As an additional precaution, the state law also requires that the Adviser submit any recommendations in writing. One copy of the recommendation, signed and dated, must be furnished to the grower. In instances where pesticide use is recommended, a copy of the report must also be provided to the dealer and applicator. Through such a licensing program, the state has developed a structure which purportedly protects the consumer from soliciting and purchasing advice on agricultural pest control from unknowledgeable or negligent sources. Likewise, the law protects the adviser from claims of misfeasance based solely upon hearsay.

The Pesticide Residue Laboratory of the California Department of Food and Agriculture provides laboratory support and assistance to the Division and to the County Agricultural Commissions in the analysis of pesticide residues. The field staff of the division and the county agricultural commissioners are mainly responsible for the collection of the samples.

B. Workforce Profile

To carry out its mandates the Agricultural Chemicals and Feed Division is currently staffed with 84 persons. It should be noted that this staffing configuration represents both headquarters personnel (forty-eight) and the eight district offices (thirty-six). Of the 48 persons situated in the headquarters in Sacramento, 20 of the positions are clerical. The following table represents the breakdown of professional and technical staff by occupational type:

TABLE VIII

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

Agricultural Chemicals and Feed Division
Current (1976) Staffing Level

Position	1976
Administrator	3
Inspector	32
Field Supervisor	10
Area Supervisor	4
Registration Specialist	8
Technician	7
TOTAL	64

All 64 positions are filled by persons with backgrounds in chemistry, entomology, plant pathology, agricultural education, and biology. The turnover rate for the Division has been negligible during the past year with an average of about 2% annually. Professional, technical, and clerical employees are all hired through the state Civil Service System.

The Pesticide Residue Laboratory is currently staffed with 14 chemists. Six of the chemists are situated in the Sacramento headquarters office, the remaining eight are located in Downey, Fresno, and Berkeley field offices; 4 in Downey, 2 in Fresno, and 2 in Berkeley. Turnover for the laboratory is minimal. The laboratory has not experienced any turnover in the last three years. The Laboratory recruits new employees through the state Civil Service System.

The actual training responsibility for the pesticide applicator certification program has been delegated the the California State Extension Service. The program has been operational since November, 1975. Dr Michael Stimmann, Director of the Office of Pesticide Applicator Training, is assisted by one staff research analyst. Dr. Stimmann, together with the research analyst, has developed the pesticide applicator training manuals. The training programs will be conducted at various locations throughout the state; however, it is currently impossible to determine the number of persons who will be serving as instructors or the number of locations at which the programs will be offered. The California Extension Service will not be directly involved with coordination of actual training programs. Instead, the office will advertise the availability of the training materials, and those persons or agencies with expertise and credentials in pesticide use will be encouraged to utilize the available materials to sponsor training programs. It is anticipated that a major portion of the 106 state community colleges will elect to develop training programs. Other agencies and organizations which may choose to coordinate an education program for pesticide applicators include county cooperative extension offices, agricultural programs, and industries which employ pesticide trainers.

In addition to the staff effort of the Training Office, there are 256 farm advisers located in the county extension service offices. Approximately 75% of the advisers allocate a certain proportion of their time to sponsoring pesticide related workshops.

The California Extension Service also has an operable Pesticide Education Coordinating Unit. The program has as its general emphasis the development of pesticide safety programs. The program is directed by Dr. A. E. Swift.

The California Extension Service has three agricultural experimental stations located in Berkeley, Davis, and Riverside. There are approximately 150 Agricultural Specialists employed through these programs. The focus of their activities is agricultural research, consulting, and materials development and publication. An undetermined amount of their time is directed toward pesticide related programs.

William Griffith heads the Pesticide Investigation Laboratory located in Sacramento. The Laboratory has three basic functions:

1) review losses in fish and wildlife caused by pesticides;
2) monitor pesticide residue levels and its relationship to marine life, inland fish, and wildlife;
3) perform evaluations on pesticide products seeking registration and on pesticide use programs of other agencies.

The Laboratory is currently staffed by six full time professionals: one administrator, two wildlife biologists, one fish and marine life biologist, and two agricultural chemists. The full time professional staff is supplemented by a corps of 18 to 25 seasonal assistants. Turnover within the professional staff is minimal. New employees are recruited through the state Civil Service System.

According to California law, there are two classifications of private sector pesticide applicators: private and commercial. The commercial applicator classification is subdivided into ten categories: forest pest control, seed treatment, aquatic pest control, regulatory pest control, research and demonstration pest control, ornamental and turf pest control, industrial, institutional, structural, and health related pest control, public health pest control, agricultural pest control, and right-of-way pest control. It is estimated that there are approximately 2.000 commercial firms within the state that perform general pest control services. These firms are staffed with an average crew of three to four persons: one supevisor and two to three applicators. In addition to the commercial applicators, it is estimated that there are approximately 700 agricultural pest control advisers. It is further estimated that there are 65,000 farmers in the state who apply pesticides.

While available information on the private sector is sketchy, it is expected that there are a number of university botanists, plant pathologists, entomologists, conservationists, agronomists, sanitarians, chemists, and engineers in the state that are involved in private research and consulting in pest control; unfortunately, no specific figures are available.

C. Workforce Projections

Within the Agricultural Chemicals and Feed Division it is estimated that the staffing level will significantly increase in the professional positions during the next five years. The growth will be focused in the inspector category, with an average annual growth of 16%. This growth reflects both the increased Division staff load generated through the Applicator Certification Program and the growth in demand for Division services as a consequence of the increased sophistication of agricultural chemicals. The following table depicts the growth in the Division by occupational type.

TABLE IX

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

Agricultural Chemicals and Feed Division
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Administrator	3	3	3	3	3	3	n/a	0
Inspector	32	40	48	56	64	73	n/a	18%
Field Supervisor	10	10	10	10	10	10	n/a	0
Area Supervisor	4	4	4	4	4	4	n/a	0
Registration Specialist	8	8	8	8	8	8	n/a	0
Technician	7	7	7	7	7	7	n/a	0
TOTAL	64	72	80	88	96	105	2%	10%

Alternatively, the Pesticide Residue Laboratory does not anticipate any further growth in staffing. Staffing of the department has been stable since 1975, and no program expansion or project development is planned which would impact the staffing of the Laboratory.

As the Pesticide Applicator Training Program becomes fully implemented the Office of Pesticide Applicator Training may require additional staff. It is estimated that a maximum of two staff positions will be necessary: one research assistant and one clerical position. No time frames have been developed for expansion of staff, as any staff increase will be dependent upon the availability of program funds.

No growth is predicted for the Pesticide Education Coordinating Unit. It is expected that there will be expansion in pesticide education activities offered through community colleges and state colleges and universities. However, the Coordinating Unit will serve more as a catalyst in encouraging involvement, rather than hosting major educational series through its office.

The Pesticide Investigation Laboratory will not experience any growth during the coming five years. No major expansion in program services is planned, nor are any new services being considered.

There will be substantial growth in pesticide programs within the private sector. More emphasis will be placed upon the skills and techniques utilized by the integrated pest managers. Experts within the area indicated that they expect as much as ten to fifteen percent annual growth in the number of pest managers. There will be a concommitant growth in the number of commerical applicators. As there is a trend toward the use of more sophisticated chemicals which require more experience and knowledge to apply, farmers will probably seek professional assistance in the application of these chemicals. It is also projected that there will be growth in the number of commerical and industrial operations using professional applicators during the next five years. This growth is expected to average 5-15% annually.

D. Training and Certification

The principal thrust of pesticide training and certification in the state is focused upon the agricultural pest advisers and pest applicators. By law, the agricultural pest advisers must annually apply to the Agricultural Chemicals and Feed Division for a license to operate within the state. Prior to licensing the applicant must pass an examination which demonstrates an ability to conduct pest control operations and knowledge of the nature and effect on materials which are used in pest control. Examinations are given in seven basic areas:

1) Insects, mites, and other invertebrates,
2) Control of plant pathogens,
3) Control of Nematodes,
4) Control of vertebrate pests,
5) Control of Weeds,
6) Defoliation,
7) Plant growth and regulation.

Currently, there are an estimated 700 persons certified and licensed as agricultural pest advisers. The Division does not maintain records on the number of persons certified by category, since there are many of advisers who elect to be certified in more than one category. It is anticipated that there will be growth in the number of persons seeking licensure as advisers; however, no estimate is available on the average annual increase in the number of persons seeking licensure.

As mentioned in the Workforce Profile, the California Office of Pesticide Applicator Training is currently developing the instructional materials for applicator training programs. The training programs will be made available for use by qualified pesticide instructors by late 1977. No projections can be made on the number of locations at which the programs will be offered, or on the number of persons who will be participating in the programs. More information will be available as the programs become operational in the Fall of 1977.

The Training Office is giving consideration to offering supportive training programs beginning in 1978. Topics which are being reviewed for potential development are Upgrade Training for Applicators, Pesticide Use for Greenhouses, and Spanish Speaking Applicator Training.

The Department of Food and Agriculture will be the agent coordinating the certification of applicators. To be certified, an applicator must pass a qualifying examination in a particular category in which he wishes to be licensed. Under the California program, commercial applicators will be certified under one or more of the following categories:

1) Agricultural Pest Control
2) Forest Pest Control
3) Ornamental and Turf Pest Control
4) Seed Treatment
5) Aquatic Pest Control
6) Right-of-Way Pest Control
7) Industrial, Institutional, Structural, and Health Related Pest Control
8) Public Health Pest Control
9) Regulatory Pest Control
10) Demonstration and Research Pest Control.

To be certified in one of these categories, the applicant must successfully complete two examinations. One examination is a general examination which tests the individual's competence and understanding of generalized application skills and techniques and federal and state laws and regulations. The second type of examination tests the individual's expertise in the technology and skills relevant to the particular type of application category in which the applicator is petitioning for certification.

The Department of Food and Agriculture is hesitant to project the number of persons seeking certification under this program. Prior to 1976, the Department offered a Licensing Program for Commerical Applicators. At present, 2,000 commerical applicators are licensed. The Department expects this number to increase with a maximum potential growth of 10,000. No projection can be made, at this time, concerning the number of private applicators who will seek certification. With 65,000 farmers in the state, the Department estimates that anywhere from 3,000 to 30,000 farmers may seek certification.

State colleges and professional organizations are becoming active in developing training in pesticide related areas. One example is the coordinated effort of the University of California, the Department of Food and Agriculture, and the California Association of Pest Control Advisers in the development of a series of pesticide training programs. The program series is merely in the planning stages, and as such, no specific information can be given on the number of hours of training or the number of locations. However, it is estimated that as many as 4,000 professionals may attend the series. Topics being considered for the program series are:

1) Crops and their relationship to pesticide use;
2) Pest Identification;
3) Pesticide Chemicals;

4) Types of Application Equipment;
5) Biological Control;
6) Integrated Pest Management;
7) Sampling Techniques;
8) Problems of Pest Resistance and Its Ramifications.

Other topics under discussion are Crop Production and Irrigation Techniques.

E. Career Potential

The career potential for personnel in both the private and the public sectors appears strong. It is projected that there will be a major increase in the demand for agricultural pest advisers, pest managers, and commercial applicators as a result of stricter enforcement activities and increased dependency upon more sophisticated chemicals. These factors will also impact two emerging occupations: commercial pesticide consultants and irrigation specialist for disease and insect control. While these professions are in existence to a limited degree at present, the demand for these specialities will grow significantly. The skills and knowledge required by professionals in these occupations will continue to diversify as new technology and more sophisticated chemical pesticides are introduced onto the market.

F. Conclusion

Following a review of pesticide control activities in California, these conclusions can be made:

1) that the workforce situation in the principal public agencies is expected to grow to a limited extent during the next five years; this growth is a consequence of increased demands upon staff posed by the applicator certification program.
2) that the private sector pesticide related occupations will experience a rapid growth and diversification as legislative enforcement activities increase and as new, more complex chemical pesticides are introduced onto the market.

From these conclusions it appears that there will be an increased reliance upon the commerical applicator and that the private farmer will not be involved in pesticide application to the degree experienced over the past five years.

In addition, as the demand for professionals and technicians in the pesticide control field increases, state educational and training institutions will give more consideration to the design and implementation of pesticide career training and continuing education programs. This emerging interest is evidenced by the activities of the University of California in the coordination of the aforementioned proposed pesticide training series.

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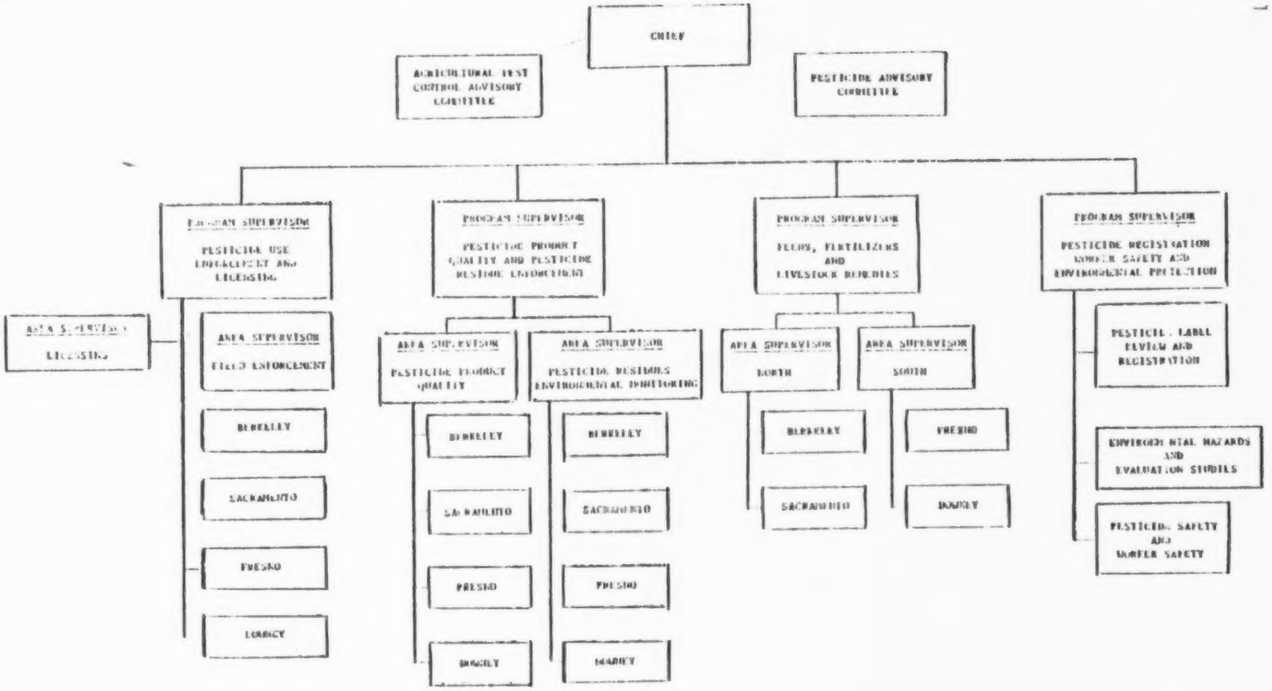
Figure 1

AGRICULTURAL CHEMICALS AND FEED

ORGANIZATIONAL CHART


CHIEF
AGRICULTURAL TEST CONTROL ADVISORY COMMITTEE
PESTICIDE ADVISORY COMMITTEE
PROGRAM SUPERVISOR
PESTICIDE USE ENFORCEMENT AND LICENSING
AREA SUPERVISOR
LICENSING
AREA SUPERVISOR
FIELD ENFORCEMENT
BERKELEY
SACRAMENTO
FRESNO
DOWNEY
PROGRAM SUPERVISOR
PESTICIDE PRODUCT QUALITY AND PESTICIDE RESIDUE ENFORCEMENT
AREA SUPERVISOR
PESTICIDE PRODUCT QUALITY
BERKELEY
SACRAMENTO
FRESNO
DOWNEY
AREA SUPERVISOR
PESTICIDE RESIDUES ENVIRONMENTAL MONITORING
BERKELEY
SACRAMENTO
FRESNO
DOWNEY
PROGRAM SUPERVISOR
FEEDS, FERTILIZERS AND LIVESTOCK REMEDIES
AREA SUPERVISOR
NORTH
BERKELEY
SACRAMENTO
AREA SUPERVISOR
SOUTH
FRESNO
DOWNEY
PROGRAM SUPERVISOR
PESTICIDE REGISTRATION WORKER SAFETY AND ENVIRONMENTAL PROTECTION
PESTICIDE LABEL REVIEW AND REGISTRATION
ENVIRONMENTAL HAZARDS AND EVALUATION STUDIES
PESTICIDE SAFETY AND WORKER SAFETY

IV. POTABLE WATER

A. Introduction

The authority for supervision and administration of potable water programs for the State of California is vested in the California Department of Health. The Department directly supervises the operation of 1,100 community water systems with a minimum of 200 service connections. There are an additional 3,000 to 5,000 water systems that are supervised by the county health departments. The systems regulated by the county health departments have fewer than 200 service connections per system. Cumulatively, these systems serve approximately 90 percent of the state's population. Fifty-three percent of the population is served by surface water sources, and 41 percent is served by ground water sources.

In addition to the regulation of public water supplies, the Department of Health has a broad range of responsibilities related to potable water programs. These responsibilities include:

1) regulation of shellfish growth in water;
2) maintenance of the quality of recreational water areas;
3) provision of technical assistance to other state agencies concerning public water related programs and services;
4) certification of all water treatment plant and water distribution system operators;
5) maintenance and updating of information on public water supplies;
6) review and approval of construction plans for water systems with 200 connections or more;
7) provision of technical assistance to cities, rural water districts, consulting engineers, state and federal agencies, individuals and equipment operators.

B. Workforce Profile

The Sanitary Engineering Section of the Department of Health has administrative responsibilities for the potable water programs. The Section has a current staffing level of 68 persons: 57 professional/technical positions, 9 clerical positions, and 2 temporary workers. The following table illustrates the breakdown of the Section's staff by occupational type.

TABLE X

CALIFORNIA DEPARTMENT OF HEALTH

Sanitary Engineering Section
Current (1976) Staffing Level

Position	1976
Administrator	3
Engineer	45
Engineering Specialist	8
Engineering Technician	1
Clerical	9
Other	2
TOTAL	68

The Other category consists of the two temporary workers. the turnover for the Section is considered to be relatively low, with an average annual rate of 5%. When position vacancies occur, the Section recruits through colleges and universities, professional conferences, and personal contacts. On occasion, the Section will accept applications from individuals on a "walk-in" basis.

Workforce figures for the county health departments potable water programs are sketchy. There are 53 counties in California, and each county has a county health department. Based upon a partial survey of county departments, it is estimated that there are from one to five persons employed in each department with partial responsibility for potable water programs. The employees frequently have backgrounds and experience as engineers, engineering technicians, and/or sanitarians. The turnover within those agencies surveyed is low, with an average annual rate of between 0-5%. Recruitment procedures varied with the agency.

The State Department of Health maintains records as to the number of operators certified by Grade qualifications. There are five grades of certified operators in California: Grade I, II, III, IV, and V. The qualifications for each grade are based upon a combination of educational and on-th-job water treatment experience. The Grade I operator has the lowest level of qualifications: no training or related work experience is required. The higest classification, Grade V, requires a minimum of a college degree plus one year on-the-job experience or two years as a Grade IV operator plus five years related work experience.

As of December, 1976, the following number of operators were certified.

TABLE XI

STATE OF CALIFORNIA

Certified Water Treatment Plant Operators (1976)

Grade	1976
I	744
II	2,386
III	1,461
IV	399
V	289
TOTAL	5,279

Turnover for the Grade I operator is the highest with an average of 10-15% annually. The turnover is considered high, due to the fact that most Grade I operators, once they gain the requisite work experience, can qualify for higher classification jobs. Likewise, the Grade II operator turnover is estimated at 10% annually. This turnover is similarly attributed to the upward mobility opportunities. Grade III and IV are somewhat more stable, with turnover estimated at 5% per annum. The upward mobility for these positions is more limited than that for the Grade I and II operators. The Grade V operator category has the lowest turnover, with an estimated turnover rate of 2% per annum. Most turnover within this category is due to retirement.

Information regarding other employees in the private sector is limited. A partial survey of water treatment facilities within the state indicated that crews vary in size and composition, with the smallest facility being operated by one operator/maintenance worker. The largest water treatment facility in California is the Department of Water and Power of the City of Los Angeles. The Department currently employs 10,454 persons to administer and operate the combined water and power facility, It is difficult to determine the exact number of water supply employees; however, the following table depicts the major segment of employees who devote a portion of their activities to water supply programs.

TABLE XII

STATE OF CALIFORNIA

LOS ANGELES DEPARTMENT OF WATER AND POWER
Water Supply Related Workforce
Current (1976) Staffing Level

Position	1976
Meter Reader	109
Service Representative	13
Maintenance Worker	595
Equipment Operator	422
Water Utility Worker	218
Mechanic	27
Supervisor	48
Superintendent	17
Operator	21
Engineer	35
Scientist	10
Other	171
TOTAL	1,767

The Other category includes pipefitters, plumbers, pumping plant supervisors, water treatment plant supervisors, meter repair persons, meter workers, and aqueduct workers. The number of administrative and clerical persons who devote a portion of their time to water supply activities was unavailable. The turnover rate for the department was also unavailable; however, during the past year the department has experienced a reduction in staff. As position vacancies occur, the positions are phased out, and the responsibilities are reassigned to other staff members. This trend is expected to continue for the next five years.

The occupations found within the Los Angeles Department of Water and Power are respresentative of the staffing structures found in comparable water treatment programs. No further information is available on the public sector water treatment workforce.

C. Workforce Profile

The Sanitary Engineering Section of the Department of Health does not anticipate any additional growth during the next five years, unless funds become avilable through federally funded programs. The Section is currently staffed with 68 persons who devote approximately 70% of their time to domestic water supply regulation. Neither the staffing level nor the percent of the staff effort is expected to increase through 1982.

As with the state programs, the county health departments do not anticipate an appreciable growth in staffing requirements. Most representatives surveyed indicated that current staffing levels would be adequate to respond to existing program requirements. They further indicated that they did not anticipate any growth or diversification in program services.

Minimal growth is estimated for the private sector. A maximum of one to two percent per annum in all occupations related to water supply is predicted through 1981. All growth would be related to growth in the population and its resulting increase in water consumption.

D. Training and Certification

The Sanitary Engineering Section has the administrative authority for the Water Treatment Plant Operator Certification Program. The Program was implemented in 1975. Since that time, 5,279 operators have participated in the certification programs. The certification examinations are offered in numerous locations throughout the state to provide ready accessibility of the program to interested participants. The Section does not predict an increase in the number of certified operators during the next five years.

There are a number of training programs available in the state for persons interested in water related programs. The San Marcos Training Center, principally a wastewater treatment training facility, does offer programs which are applicable to water treatment facility personnel. Such classes include courses in laboratory analysis, mathematics, maintenance, and safety. No estimate is available on the number of water treatment plant employees who participate in the programs annually. A total of 480 persons participated in training available through the Center during 1976. During the coming five years the number of persons participating in the programs is expected to grow steadily.

Training in water supply is also available through several community colleges in the state. Foremost among the colleges offering programs are Orange Coast, Santa Ana, Contra Costa, Sacramento City, and Sierra. These colleges offer ongoing water and wastewater treatment programs. Cumulatively, these colleges train an average of 425 operators annually. A steady growth in enrollment is projected for these courses during the next five years.

Other of the 106 community colleges in the state offer sporadic water supply training programs; however, no information is available on the enrollment in these programs.

E. Career Potential

Career opportunities within the Sanitary Engineering Section of the Department of Health will be minimal during the next five years. The Section does not anticipate any growth in either the size of the staff or in the amount of staff effort devoted to potable water programs.

There will be limited staff expansion in water supply programs operated through the county health departments. The departments estimated that current staffing levels will continue to be adequate through 1982.

The municipal water treatment facilities within the state will experience a maximum of one to two percent growth within the next five years. This growth will be related to increased population and the consequential demand for customer service.

Upward mobility within the Grade I and Grade II water treatment plant operators is strong. The high degree of mobility is demonstrated by the high turnover rates. The upper grade operators have more limited upward mobility opportunities. Most turnover in these positions is attributable to retirement.

F. Conclusion

The workforce requirements and career opportunities for water supply programs within the State of California have stabilized. Little growth in either the private or the public workforce is anticipated during the next five years. In addition, training programs for all levels and types of occupations in the potable water field are readily accessible.

Experts within the field indicated that any growth within the potable water field would be directly related to federal legislation or federal or state requirements. To date, there is no apparent emerging legislation of this nature which would have an appreciable impact upon the water programs in California.

V. RADIATION

A. Introduction

The Radiologic Health Section of the California Department of Health is the primary environmental radiation and radiological health administrative agency within the state. The Section has one satellite office located within the Bureau of Occupational and Radiation Management at the Community Health Services Agency in Los Angeles. The principal function of the agencies is to eliminate unnecessary and unproductive man-made radiation. The programs have six basic activities:

1) regulation and inspection of X-ray equipment;
2) licensing and inspection of all users of radiation;
3) examination and certification of professional competence of persons who use radiation in the healing arts;
4) environmental surveillance activities contracted from Nuclear Regulatory Commission;
5) general environmental surveillance and monitoring in areas adjacent to nuclear power facilities;
6) source related analysis of milk, water, and sewage.

Under the state radiation equipment licensing activity, California has a regulatory licensing program for medical and industrial radiological X-ray programs. There are an estimated 17,510 dental and 12,556 medical X-ray programs within the state. In addition, there are 249 programs with Nuclear Regulatory Commission licenses and 1,685 Agreement State licenses. (Statistics taken from a report prepared for the U.S.

Department of Health, Education, and Welfare, Report on State and Local Radiological Health Programs, October, 1976.)

The 1,685 Agreement State Licenses are categorized into five classifications: 1) medical, 2) academic, 3) industrial, 4) civil defense, and 5) other. There are 552 medical licenses, 77 academic, 805 general industrial, 71 civil defense, and 180 other. Of the 1,685 licensees, 500 of the facilities are located within the Los Angeles District.

B. Workforce Profile

The Radiologic Health Section is currently staffed with thirty-one professional/technical positions and twenty-two clerical positions. The following table illustrates the distribution of staff by occupational type:

TABLE XIII

CALIFORNIA DEPARTMENT OF HEALTH

Radiologic Health Section
Current (1976) Staffing Level

Position	1976
Radiation Health Physicist	16
Radiation Protection Specialist	12
Research Writer	1
Administrator	1
Other	1
TOTAL	31

The Other position is a student assistant. The Section provided the following breakdown of staff effort in terms of person-year allocations:

11.4 in licensing, 17.0 in inspection, 2.8 in environmental monitoring, 31.6 in X-ray inspection, and 16.7 in X-ray certification.

Turnover within the program is minimal. As vacancies occur in the Section, numerous recruitment methods are used to advertise the positions. The Section contacts the Health Physicist Society and the Radiation Technology Society for referrals. In addition, advertisements are placed in professional journals and local newspapers. On occasion, the Section will interview applicants on a walk-in basis.

The radiation program, located within the Bureau of Occupational and Radiation Management in Los Angeles, is currently staffed with nine professional/technical positions and three clerical positions. The following table provides a breakdown of agency staff by occupational type.

TABLE XIV

COMMUNITY HEALTH SERVICES

Bureau of Occupational and Radiation Management
Current (1976) Staffing Level

Position	1976
Radiation Health Physicist	3
Radiation Protection Specialist	5
Administrator	1
TOTAL	9

Turnover within the Bureau averages about one person per year, e.g., 18%. As position vacancies occur, the Bureau recruits through professional societies, hospitals and clinics with existing radiological health programs, and professional journals.

Workforce statistics for the "radiation control" occupations within the private sector are difficult to assess. However, the Section was able to provide a general overview of activities within the state. Of the 552 medical licensees, there are approximately 156 clinics which have at least one radiation safety officer. In the larger facilities, a Radiation Safety Commission assists in defining policies and programs relevant to radiation control. There is no estimate for either the number of functioning commissions or the number of persons serving on the commissions. Most of the 77 academic institutions with licenses have full-time staff members responsible for radiation control. At the smaller institutions, the radiation control crew will generally consist of one safety officer and one assistant. At the larger institutions, the crew will frequently be composed of one safety officer and three to four assistants. Within the 805 industrial licenses, the crew size will range in size from two to twenty. The 71 civil defense licensees are civil defense safety programs. Each county in California has a program in civil defense. The training programs available through each county are usually directed at emergency training for fire departments and police departments. There is usually at least one instructor per program. The 180 other licensees are frequently governmental programs such as the Department of Health. In most instances, there is one radiation control specialist at each of the 180 programs.

The Energy Research and Development Administration (ERDA) has also provided estimates on the nuclear related technician workforce within Califorinia. The following information on the available nuclear related workforce was taken from the ERDA publication entitled An Analysis of Nuclear Related Technician Manpower in Western States.

TABLE XV

STATE OF CALIFORNIA

Nuclear Related Technician Workforce
Current Estimate (1976)

Job Title	1976
Production, Test or Research Reactor Operator	69
Accelerator Operator	125
Radioisotope - Production Operator	85
Nuclear Power Plant Operator	132
Nuclear Material Processor, Senior	16
Hot-Cell Technician	34
Nuclear Facility Equipment Operator	206
Nuclear Facility Maintenance Technician	174
Plutonium Handling Technician	43
Tritium Handler	3
Other Nuclear Test and Production Technician	7
Radiation Control Technician	272
Nuclear Facility Chemistry (Radiochemistry Technician)	303
Non-Destructive Testing Technician	606
Radiographer	442
Nuclear Geological Technician	11
Nuclear Technician Custodian	16
Instrumentation and Control Technician	116
Well-Logging Technician	110
X-ray Calibration Technician	33
Radiologic Technician	2,197
Nuclear Medical Technologist	736
Urology X-ray Technician	65
Orthopedic Radiologic Technician	62
Special Procedures Technician	263
Radiation Therapy Technician	205

TABLE XV

(continued)

Job Title	1976
Internal Dosimetry Technician	20
Radiobiology Technician	275
Radiopharmacist	31
Inhalation Toxicology Technician	10
Other Medical-Related (Nuclear) Technician	1
Soils Evaluation Technician	629
TOTAL	7,297

C. Workforce Projections

The Radiologic Health Section anticipates adding from five to six persons to the staff during the next five years. Three of the five positions would be added to the X-ray inspection program, and the remaining two positions will be added to the X-ray licensing program. No specific time frames have been developed for adding these positions. Minimal expansion is anticipated within the environmental monitoring program; consequently, no new positions will be added.

The Bureau of Occupational and Radiation Management in Los Angeles estimates that a maximum of two positions will be added to the Bureau during the next two years. A request will be made for one health physicist and one senior radiation protection specialist. The growth will be in response to increasing demands upon staff time. No expansion or new programs are currently planned.

Growth projections for the private sector are sketchy. The Radiologic Health Section estimates that there will be limited growth during the next five years. There may be as much as one to two percent annual growth in safety officer requirements, five percent growth in the demand for X-ray technicians, and five percent increase in the demand for radiation health specialists, and a maximum of five percent growth in the demand for health physicists.

The ERDA report on nuclear related workforce requirements does contain information on the estimated number of persons to be employed in the nuclear related technician field during 1977. The following table contains information on 1977 workforce projections and also the calculated annual growth rate between 1975 and 1977.

TABLE XVI

STATE OF CALIFORNIA

Nuclear Related Technician Workforce
Workforce Projection (1977)

Job Title	1977	%/annum growth
Production, Test or Research Reactor Operator	72	4%
Accelerator Operator	152	12%
Radioisotope - Production Operator	91	15%
Nuclear Power Plant Operator	141	14%
Nuclear Material Processor, Senior	19	13%
Hot-Cell Technician	39	9%
Nuclear Facility Equipment Operator	230	18%
Nuclear Facility Maintenance Technician	181	7%

TABLE XVI

(continued)

Job Title	1977	%/annum growth
Plutonium Handling Technician	56	37%
Tritium Handler	4	27%
Other Nuclear Test and Production Technician	7	5%
Radiation Control Technician	300	10%
Nuclear Facility Chemistry (Radiochemistry Technician)	375	18%
Non-Destructive Testing Technician	660	16%
Radiographer	480	12%
Nuclear Geological Technician	13	38%
Nuclear Technician Custodian	3	7%
Instrumentation and Control Technician	145	17%
Well-Logging Technician	123	18%
X-ray Calibration Technician	38	20%
Radiologic Technician	2,348	9%
Nuclear Medical Technologist	858	18%
Urology X-ray Technician	71	8%
Orthopedic Radiologic Technician	71	16%
Special Procedures Technician	299	15%
Radiation Therapy Technician	229	12%
Internal Dosimetry Technician	23	15%
Radiobiology Technician	288	1%
Radiopharmacist	41	32%
Inhalation Toxicology Technician	1	7%
Other Medical-Related (Nuclear) Technician	1	0
Soils Evaluation Technician	652	5%
TOTAL	8,011	10%

During the past three years there has been an average estimated growth of 10% in the nuclear related technician workforce. If this trend continues, by 1981 there will be approximately 11,560 persons employed in the nuclear technician related workforce.

D. Training and Certification

The Radiologic Health Section provides new employees with extensive on-the-job training. During the first week on the job, the new employee attends a general orientation program. The orientation session consists of formal discussion concerning agency processes and procedures. Following the orientation, the new employee participates in an informal six-month apprenticeship program. During the apprenticeship, the new employee works with more experienced employees. The apprenticeship training serves to initiate the new employee into the departmental and technical procedures. Most persons recruited into the program should have backgrounds in radiological health, health physics, or bionucleonics.

The Radiologic Health Section encourages the staff members to participate in formal continuing education programs. It is estimated that each professional staff person participates in an average of ten days of upgrade training annually. Many of the courses attended by the staff are offered through Oak Ridge University Association. The programs are offered by the Nuclear Regulatory Commission. Other programs are available through the Bureau of Radiological Health, U.S. Department of Health, Education, and Welfare.

E. Career Potential

The overall career potential for existing professional occupations in the radiation control field is considered by experts to be extremely bright. Growth in the number of available new positions within the State Agencies has stabilized during the past two to three years. This pattern is expected to continue. The State Agencies are not currently considering expansion of the environmental aspect of the radiation control program. As evidenced by the projected growth patterns, the major thrust in program expansion is in the X-ray program monitoring and licensing area. No growth is projected in the environmental surveillance staff.

The private sector will experience an average annual growth in workforce requirements from 1% up to 15% depending on the type of occupation. The most consequential growth will be in the nuclear related disciplines. This anticipated growth is underscored by the fact that there are currently five operational nuclear power units in California. Seven additional units are planned. As these seven units become functional, there will be a steady growth in the demands for trained professionals with backgrounds in radiation technology and control.

F. Conclusion

Two conclusions may be made concerning the workforce projections for radiation control programs in the State of California:

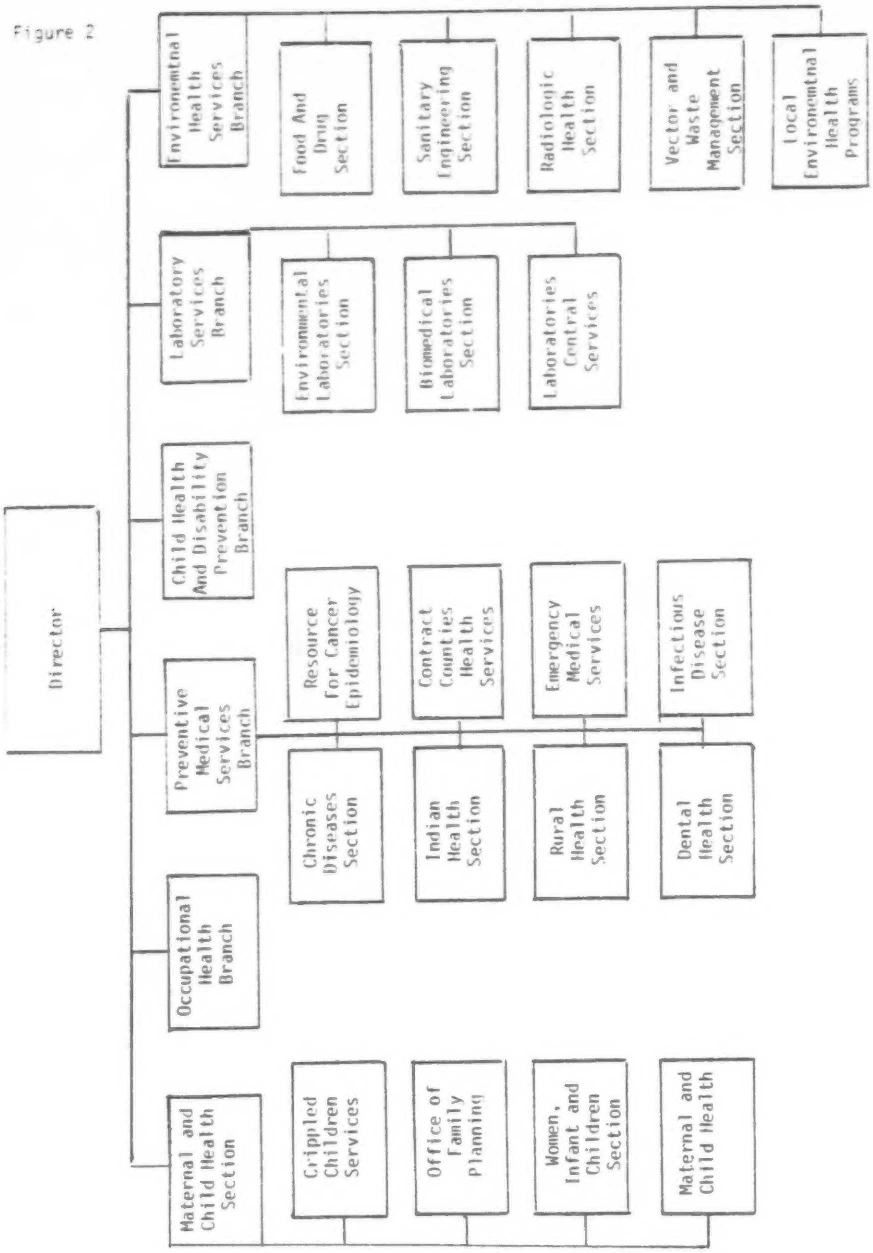
1) that the career potential for professional occupations in the radiation technology and control field is extemely bright;

2) that the growth in private sector demands for personnel with training in radiation technolgy and control will steadily increase at an average rate of 5-19 percent during the next five years.

Training programs which educate health physicists and radiological health specialists have limited availability. Educational institutions have not extensively explored the feasibility of developing such programs. With the growth in demand for professionals in the radiation control field, educational institutions should explore the feasibility of developing such programs.

Figure 2

PUBLIC HEALTH DIVISION
ORGANIZATIONAL CHART


Director
Maternal and Child Health Section
Crippled Children Services
Office of Family Planning
Women, Infant and Children Section
Maternal and Child Health
Occupational Health Branch
Preventive Medical Services Branch
Chronic Diseases Section
Indian Health Section
Rural Health Section
Dental Health Section
Resource for Cancer Epidemiology
Contract Counties Health Services
Emergency Medical Services
Infectious Disease Section
Child Health And Disability Prevention Branch
Laboratory Services Branch
Environmental Laboratories Section
Biomedical Laboratories Section
Laboratories Central Services
Environemtnal Health Services Branch
Food And Drug Section
Sanitary Engineering Section
Radiologic Health Section
Vector and Waste Management Section
Local Environemtnal Health Programs

VI. SOLID WASTE

A. Introduction

Each year California accumulates twenty million tons of residential and commercial waste or approximately one ton per person per year. Thirty-five million tons of agricultural waste and fourteen million tons of industrial waste are also produced annually. Estimates indicate that about a quarter of the nine million tons of waste paper is recoverable and more than three million tons of waste metal and glass can be recycled.

In an attempt to effectively control the growing solid waste problem, the California Solid Waste Management Board was created in 1972. The Board was authorized by the Nejedly-Z'berg-Dills Solid Waste Management and Resource Recovery Act of 1972. This legislation recognized the need for a statewide program to establish and maintain a high standard of performance in the areas of collection, transfer, and disposal of solid wastes, and to emphasize resource recovery operations as a means of conserving natural resources.

The law directed the newly-formed Board to establish and maintain a comprehensive state solid waste management and resource recovery policy in concert with the environmental health protection programs of the State Department of Health. The objectives of the Board's programs are to assist and guide local solid waste operations toward greater protection of the public health, safety and well-being, enhance the environment by upgrading collection and disposal operations and maximize the reutilization and conversion of the material resources and energy presently contained in the solid waste stream.

The Nejedly-Z'berg-Dills Solid Waste Management and Resource Recovery Act is specific in its directions for the manner and mechanism to be used in the implementation of its objectivies. California's 58 counties are given the responsibility of preparing individual Solid Waste Management Plans that have the concurrence of the majority of the cities with the majority of the population within the county. The State Board was mandated the following tasks:

1) establish statewide solid waste management policies;
2) adopt minimum standards;
3) develop planning guidelines upon which county solid waste management plans are based;
4) adopt a resource recovery program;
5) submit a report on improved methods of controlling and reducing the problem of litter;
6) study alternative methods of providing financial assistance to local agencies;
7) render technical assistance;
8) implement a public information program;
9) conduct and coordinate studies on new solid waste handling methods;
10) implement a statewide solid waste management information system.

In implementing these objectives, the Board provides technical assistance, information, training, and guidelines to the public and private sectors and to all local agencies in accordance with the legislative mandates and the policy and standards of the Board. It also provides leadership and assistance to local entities and private concerns toward resolution of the problems of litter in California.

B. Workforce Profile

The Solid Waste Management Board is currently staffed with thirty-five professional/technical positions. The majority of the professionals have backgrounds and experience in engineering, physical science, or economics. The following table illustrates the distribution of professional/technical positions by occupational types.

TABLE XVII

CALIFORNIA SOLID WASTE MANAGEMENT BOARD

Current (1976) Staffing Level

Position	1976
Engineer	9
Other	26
TOTAL	35

The Other category includes six administrators, six solid waste specialists, four resource economists, two planners, and eight student assistants. The Board support staff consists of ten clerical positions. Turnover in the Board is relatively low, averaging two percent annually, except for the student assistant positions which average fifty percent annually. The low turnover is attributed to good working conditions and general satisfaction with program operations. New employees are recruited through the state Civil Service System.

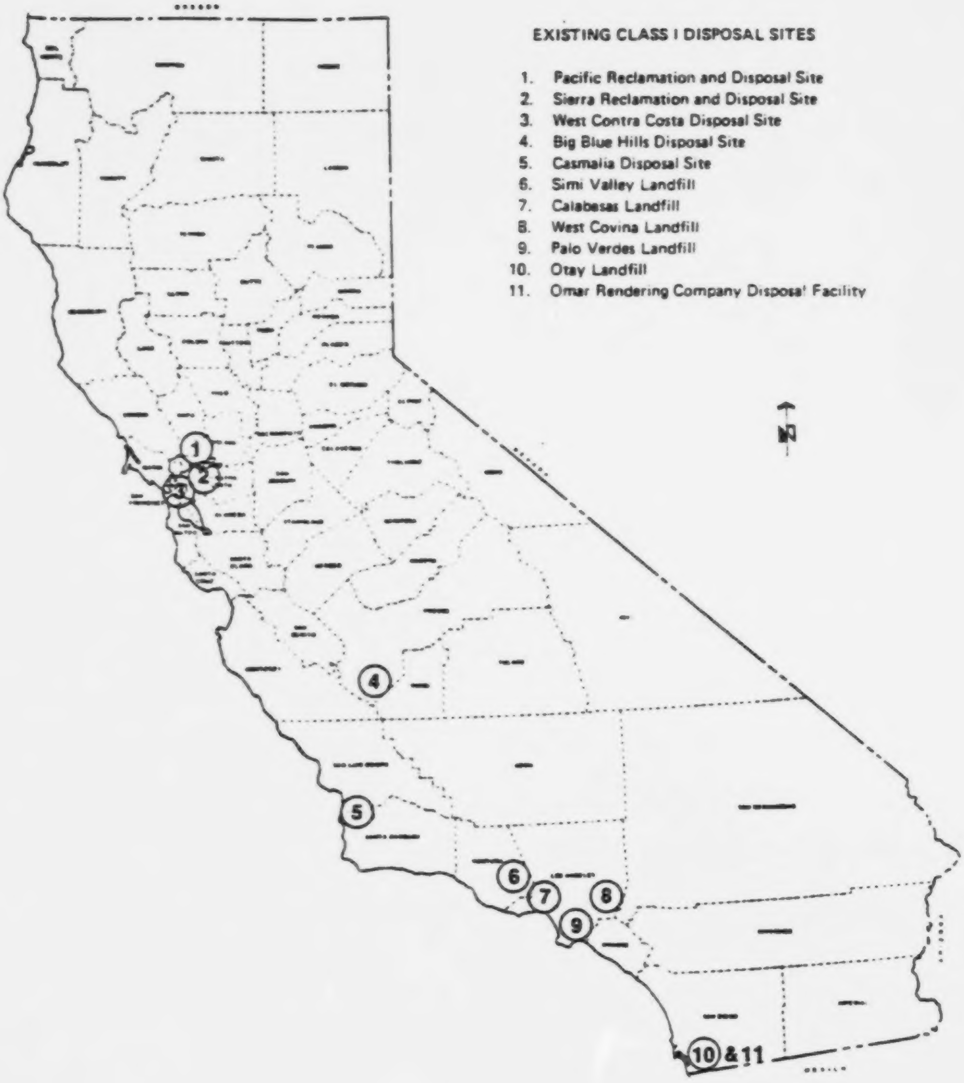
For purposes of examining the solid wastes related workforce profile within the state, the program has been divided into four categories: sanitary landfills, hazardous wastes, collection systems, and resource recovery programs.

There are 428 sanitary landfills within the state. The Board uses a landfill classification system which was developed by the State Water Resources Board. The system is based upon the type and quality of geological and man-made conditions which protect the vertical and lateral continuity into usable surface and groundwater sources. There are four basic classes of landfills. The California State Board of Health has a second type of landfill classification system which is based upon usage. The Solid Waste Management Board is developing a classification system for landfills which will integrate the specifications of both the Water Resources Board and the Board of Health. The sanitary landfills are both privately and publicly owned.

The state has eleven operational hazardous waste sites. These sites are classified as Type I Disposal Sites. In addition to these eleven sites, fifty sites may receive limited quantities of certain types of environmentally dangerous wastes. These sites are classified as Class II-1 Disposal Sites. In August, 1976, the California State Solid Waste Management Board prepared for the legislature a report on the disposal of environmentally dangerous wastes in California. The report contained both maps illustrating the locations of these sites and tables which defined the facility name, location, operating agency, and type of waste accepted. The map and table for both Class I and Class II-1 sites are include with this report. The report also included information explaining the estimated production of environmental dangerous waste by county. The accompanying table which estimates the total industrial waste, wastewater treatment sludge, and pesticide containers produced by county is also include with this report. The Class I and Class II-1 Disposal sites are both privately and publicly operated.

FIGURE 3

STATE OF CALIFORNIA


EXISTING CLASS I DISPOSAL SITES
1. Pacific Reclamation and Disposal Site
2. Sierra Reclamation and Disposal Site
3. West Contra Costa Disposal Site
4. Big Blue Hills Disposal Site
5. Casmalia Disposal Site
6. Simi Valley Landfill
7. Calabesas Landfill
8. West Covina Landfill
9. Palo Verdes Landfill
10. Otay Landfill
11. Omar Rendering Company Disposal Facility
N
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9
10 & 11

TABLE XVIII

STATE OF CALIFORNIA

Existing Class 1 Disposal Sites

Site Number	Site Name	Operator	Location	Primary Service Area	Types of Wastes Accepted
1	Pacific Reclamation and Disposal Site	Pacific Disposal Systems, Inc.	Solano County	Northern California	Liquids and sludges only.
2	Sierra Reclamation and Disposal Site	Pacific Disposal Systems, Inc.	Contra Costa County	Northern California	Limited liquids and sludges. No volatile materials.
3	West Contra Costa Disposal Site	Richmond Sanitary Service	Contra Costs County	Northern California	Liquids, sludges, and solid wastes.
4	Big Blue Hill Disposal Site	Fresno County Dept. of Public Works	Fresno County	San Joaquin Valley	Limited sludges, pesticide containers and solids.
5	Casmalia Disposal Site	Kenneth R. Hunter, Jr.	Santa Barbara County	Santa Barbara, San Luis Obispo, Kern Counties	Liquids, sludges, and pesticide containers.
6	Simi Valley Landfill	Ventura Regional County Sanitation District	SE Ventura County	Ventura and Los Angeles Counties	Liquids, sludges, and solid wastes. No volatile materials.

TABLE XVIII

(continued)

Site Number	Site Name	Operator	Location	Primary Service Area	Types of Wastes Accepted
7	Calabasas Landfill	Los Angeles County Sanitation District	Los Angeles County	Los Angeles County	Liquids, sludges, and solid wastes.
8	West Convina Landfill	BKK Corporation	Los Angeles County	Los Angeles, Riverside, and San Bernardino Counties	Liquids, sludges, and solid wastes.
9	Palos Verdes Landfill	Los Angeles County Sanitation District	Los Angeles County	Los Angeles and Orange Counties	Liquids, sludges, and solid wastes. No acid or volatile materials.
10	Otay Landfill	San Diego County Disposal Division	San Diego County	San Diego and Imperial Counties.	Liquids, sludges and solid wastes. No acid volatile material.
11	Omar Rendering Company Disposal Facility	Omar Rendering Company	San Diego County	San Diego and Imperial Counties	Liquids and slurries. No oily wastes. No acids or volatiles.

TABLE XIX

STATE OF CALIFORNIA

Existing Class II-1 Disposal Sites

Facility Name	Location	Operating Agency	Type of Waste Accepted
Sheepy Ridge Solid Waste Disposal Site	Siskiyou County	City of Tulelake	Empty Pesticide Containers Selected materials
Sonoma County Site	Sonoma County	Sonoma County	Drilling Mud, Pesticide Containers
Macil State No. 1	Mendocino County	Sun Oil Company	Drilling Mud
Sump Torchio and Ferro No. 2	Mendocino County	Sun Oil Company	Drilling Mud
Disposal Sumps	Sonoma County	Pacific Energy Company	Petroleum Fractions, Drilling Mud Additives
Disposal Sumps	Sonoma County	Shell Oil Company	Petroleum Fractions, Drilling Mud Additives
Disposal Sumps	Contra Costa County	Union Oil Company	Petroleum Fractions, Drilling Mud Additives
Acme Field Lanfill	Contra Costa County	Acme Corporation	Oil Wastes, Drilling Mud
Ash Hill	San Bernardino County	Santa Fe Railroad	Oil Sludge

TABLE XIX

(continued)

Facility Name	Location	Operating Agency	Type of Waste Accepted
Hollister - San Benito County Refuse	San Benito County	City of Hollister	Munitions Plant Wastes, Sludges, Heavy Metals, Acetone Wastes
Sludge Disposal for Districts 26 and 32	Los Angeles County	Los Angeles County Sanitation District	Wastewater Treatment Sludges
Operating Industries, Inc. Landfill	Los Angeles County	Operating Industries, Inc.	Liquids, Drilling Mud
Spadra	Los Angeles County	Los Angeles County Sanitation District	Liquids
Puente Hills	Los Angeles County	Los Angeles County Sanitation District	Liquids
Eastlake Sanitation Landfill	Lake County	Lake County Department of Public Works	Pesticide Containers
Geothermal Operations	Lake County	Union Oil Company	Drill Muds
WW Disposal Facility	Placer County	Auburn Sanitary Landfill	Sanding Dust, Cleanup Liquids from Melamine Treaters
Flannery Road Mud Disposal	Solano County	Aqua Clear Farms	Waste Drilling Muds

TABLE XIX

(continued)

Facility Name	Location	Operating Agency	Type of Waste Accepted
Solid Waste Disposal Facility	Yolo County	Yolo County Central Landfill	Pesticide Containers
Evans Road Landfill	Colusa County	Colusa Co. Public Works	Pesticide Containers
Stonyford Landfill	Colusa County	Colusa Co. Public Works	Pesticide Containers
Buena Vista Landfill	Amador County	Amador County	Pesticide Containers
Class II-1 Solid Waste Disposal	San Joaquin County	Foreward, Inc.	Pesticide Containers
Environmental Disposal Service	Fresno County	McKay Trucking	Oil Sump Sludge, Brine and Drilling Mud
Disposal Facility	Kern County	M.P. Oil Company	Oil Wastes
Eastside Disposal Farm	Kern County	McKay Trucking	Oil Wastes
Westside Disposal Farm	Kern County	McKay Trucking	Oil Wastes
Disposal Facility	Kern County	Diversified Chemical Corporation	Oil Wastes
Elk Hills Disposal Site No. 1	Kern County	Williams Brothers	Oil Wastes

Table XIX

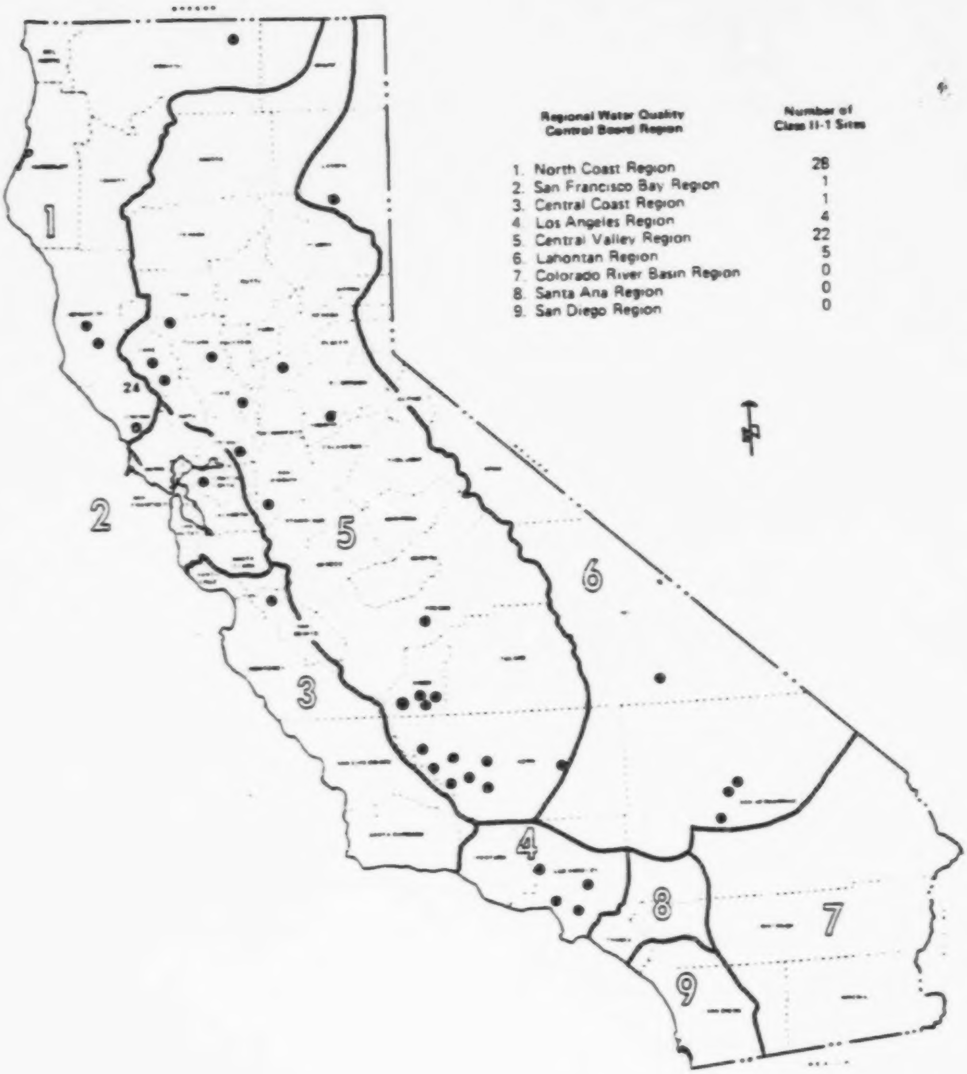
(continued)

Facility	Location	Operating Agency	Type of Wastes Accepted
Elk Hills Disposal Site N. 2	Kern County	Williams Brothers	Oil Wastes
Kerto Disposal Facility	Kern County	Williams Brothers	Oil Wastes
McKittrick Solid Waste Disposal Site	Kern County	Williams Brothers	Oil Wastes
Liquid Waste Disposal	Kings County	McKay Trucking	Oil Wastes
Disposal Facility	Kings County	Kings Waste Disposal Company	Oil Wastes
Beacon Oil Company Kettleman	Kings County	Beacon Oil Company	Oil Wastes - related
Standard Oil	Kings County	Standard Oil	Oil Wastes
Sanitary Landfill	Lassen County	Lassen County Solid Wastes	Pesticide Containers
Solid Waste Disposal Site	Inyo County	Union Carbine Corporation	Sodium Sulfate Slurry
Brine Disposal	San Bernardino Co.	City of Barstow	Brine
Fort Irwin Road SWDS	San Bernardino Co.	Atchison, Topeka and Santa Fe Railroad	Oil Sludge

FIGURE 4

STATE OF CALIFORNIA

Class II-1 Disposal Sites



Regional Water Quality Control Board Region	Number of Class II-1 Sites
1. North Coast Region	28
2. San Francisco Bay Region	1
3. Central Coast Region	1
4. Los Angeles Region	4
5. Central Valley Region	22
6. Lahontan Region	5
7. Colorado River Basin Region	0
8. Santa Ana Region	0
9. San Diego Region	0

TABLE XX

STATE OF CALIFORNIA

Estimated Production of Environmental Dangerous Wastes by County

County	Industrial	Wastewater Treatment Sludge	Pesticide Containers	Totals
Alameda	144,200	226,600	14	370,800
Alpine	none	100	1	100
Amador	unknown	3,200	1	3,200
Butte	unknown	23,800	33	23,800
Calaveras	unknown	3,300	1	3,300
Colusa	unknown	2,500	28	2,500
Contra Costa	309,600	123,600	14	433,200
Del Norte	100	3,200	1	3,300
El Dorado	none	11,100	1	11,100
Fresno	6,300	91,800	221	98,300
Glenn	none	3,700	20	3,700
Humboldt	unknown	21,300	1	21,300
Imperial	22,300	16,500	750	39,600
Inyo	unknown	3,600	0	3,600
Kern	69,200	71,300	1,700	142,200
Kings	5,100	13,800	51	19,000
Lake	none	5,000	4	5,000
Lassen	none	3,900	1	3,900
Los Angeles	287,800	1,421,600	135	[illegible],709,500
Madera	58,000	9,300	101	67,400

TABLE XX

(continued)

County	Industrial	Wastewater Treatment Sludge	Pesticide Containers	Totals
Marin	unknown	44,700	21	44,700
Mariposa	none	1,600	1	1,600
Mendocino	none	11,900	6	11,900
Merced	unknown	23,700	165	23,900
Modoc	none	1,600	2	1,600
Mono	unknown	6,900	1	6,900
Monterey	14,500	55,800	181	70,500
Napa	14,400	18,600	12	33,000
Nevada	none	5,700	1	5,700
Orange	679,700	351,500	416	1,031,600
Placer	70	19,200	3	19,300
Plumas	unknown	2,800	0	2,800
Riverside	unknown	108,200	73	108,300
Sacramento	6,500	142,900	13	149,400
San Bernardino				213,200
San Diego	12,300	323,000	31	335,300
San Francisco	15,700	137,900	1	153,600
San Joaquin	7,200	63,400	239	70,600
San Luis Obispo	1,400	26,000	20	27,400
San Mateo	19,100	117,400	4	136,500
Santa Barbara	3,500	58,200	61	61,700
Santa Clara	23,800	249,000	19	272,800
Santa Cruz	400	31,400	36	31,800

TABLE XX

(continued)

County	Industrial	Wastewater Treatment Sludge	Pesticide Containers	Totals
Shasta	none	18,100	6	18,100
Sierra	none	500	1	500
Siskiyou	unknown	7,300	2	7,300
Solano	120,000	37,000	39	157,700
Sonoma	900	51,500	12	52,400
Stanislaus	11,000	44,100	221	55,300
Sutter	unknown	9,400	60	9,500
Tehama	unknown	6,600	10	6,600
Trinity	80	1,900	1	2,000
Tulare	unknown	42,500	173	42,700
Tuolumne	none	5,600	1	5,600
Ventura	20,700	91,600	214	112,500
Yolo	300	21,500	68	21,900
Yuba	unknown	9,200	17	9,200

There are a total 596 collection systems within the state. The systems are both publicly and privately owned and operated. No information is available on the percentage of the firms privately or publicly operated.

There are no existing resource recovery programs within the state. However, within the next two to three years, two sites are planned for operation. The sites will be located in the San Francisco Bay area and in the San Diego area.

No information is currently available on the number of employees working in the sanitary landfills, hazardous waste sites or in collection activities. Likewise, there is little information on turnover or career potential for the field. However, the Solid Waste Management Board indicated that starting in July, 1977, Local Solid Waste Enforcement Agencies will be created within each county. The Board anticipates that within 18 months of the implementation of this program the state would have available information on staffing levels and occupational types in each of the areas of concern.

C. Workforce Projections

The California Solid Waste Management Board anticipates major growth during the coming five years. During 1977, the Board projects a 100% increase in staff. From 1977 through 1982, the Board estimates an annual average growth of 27%. The following table depicts this growth rate in terms of staffing requirements.

TABLE XXI

CALIFORNIA SOLID WASTE MANAGEMENT BOARD

Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	9	18	20	22	24	26	2%	28%
Other	26	52	56	62	67	72	2%*	27%
TOTAL	35	70	76	84	91	98	2%*	27*

*The student assistant turnover rate is not included within the turnover rate calculation. Permanent staff have an average turnover rate of 2%. The student assistant employees, temporary workers, have an average annual turnover rate of 50%

The clerical positions are expected to grow at the same rate as the professional/technical staff. This growth pattern reflects the increased program responsibilities of the agency specifically in the areas of resource recovery and the provision of technical assistance to the local counties in the development of the local solid waste enforcement agencies.

Moderate growth is predicted within the private sector sanitary landfills, hazardous waste programs, resource recovery operations, and collection system programs. The exact amount of annual growth cannot be determined accurately. The growth will be directly related to population growth and industrial expansion.

D. Training and Certification

The State of California does not currently offer a sanitary landfill operator training program. However, the state is considering developing a program within the next five years. No consideration has been given to offering training or certification programs in the area of hazardous waste, collection system management, or resource recovery.

E. Career Potential

Career prospects within the solid waste management field are strong. Major growth is predicted for the state and local agencies as a direct consequence of the Resource Conservation and Recovery Act and the implementation of the Local Solid Waste Enforcement Agency program. During 1977, the staff of the California Solid Waste Management Board is expected to double. Between 1977 and 1982, the Board also predicts an annual increase of 27 percent.

Moderate growth is predicted for the solid waste management private sector programs. No estimate is currently available on the average annual growth for the sanitary landfills, hazardous waste, resource recovery, and collection system programs.

Upgrade opportunities and career potential for sanitary landfill operators are generally considered as limited. However, with available on-the-job training, most solid waste program employees are able to obtain higher paying jobs in related occupations such as heavy equipment operators within the construction industry. While there are no distinctly unique emerging occupations in this field, the existing landfill occupations may be altered to enable the landfills to accomodate other types of materials than those currently handled.

Career opportunties within the hazardous wastes and resource recovery fields are considered to be extremely bright. This projection is generally based upon the anticipated impact of the Resource Conservation and Recovery Act.

The career potential for collection system workers is considered limited. There is little upward mobility or skill transferance to other occupations. During the next five years, a moderate growth in available positions is anticipated. Such growth will be directly attributable to growth in population.

F. Conclusion

Three conclusions may be made following a review of workforce projections for the solid waste management programs in the State of California:

1) that the California Solid Wastes Management Board will experience major growth during the next five years; this growth is related to the expansion of technical assistance to the counties and to the Resource Conservation and Recovery Act;

2) that occupations within the hazardous wastes and resource recovery fields have strong career potential and that during the next five years, numerous employment opportunties will be emerging; this growth will be attributable to the impact of the Resouce Conservation and Recovery Act;

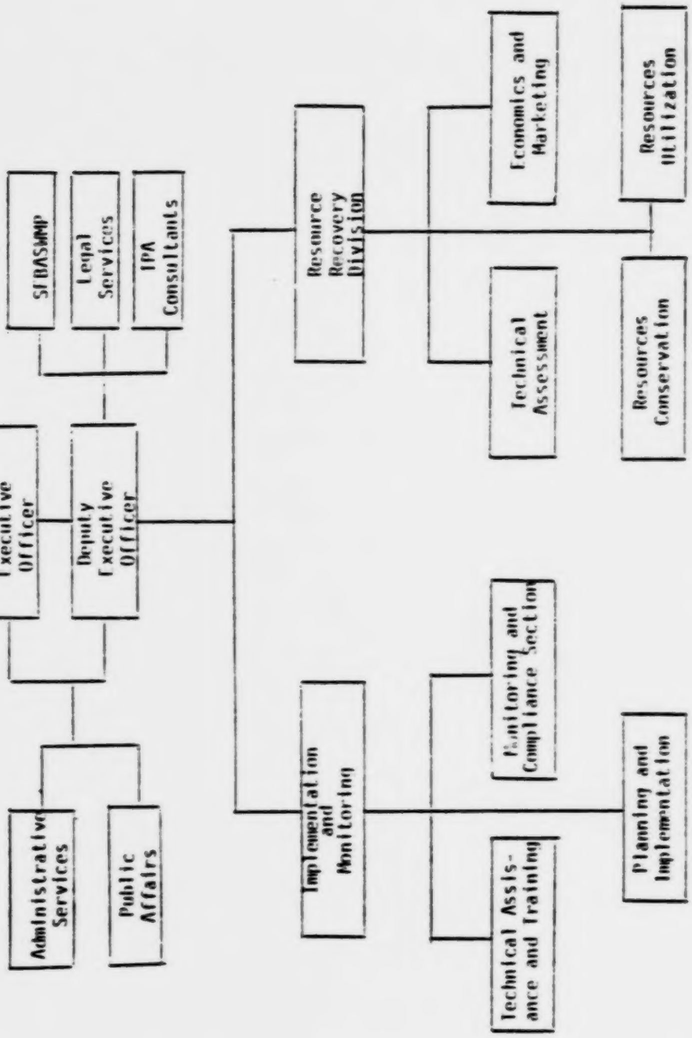
3) that occupations within the sanitary landfill operations and solid waste collection systems have a limited career potential and that during the next five years a moderate number of new employment opportunities will be created; this growth will be a consequence of increase in population.

Training programs for the technical occupations are generally not available in California. Educational institutions have not extensively explored solid waste training programs. With the growth in this field, educational institutions might well review technical training opportunties.

Figure 5

CALIFORNIA SOLID WASTE MANAGEMENT BOARD

ORGANIZATIONAL CHART


SFBASWMP
Legal Services
IPA Consultants
Executive Officer
Deputy Executive Officer
Administrative Services
Public Affairs
Resource Recovery Division
Economics and Marketing
Technical Assessment
Resources Utilization
Resources Conservation
Implementation and Monitoring
Monitoring and Compliance Section
Technical Assistance and Training
Planning and Implementation

VII. WASTEWATER

A. Introduction

The California State Water Resources Control Board is the principal wastewater environmental regulatory agency in the state. The basic responsibility of the Board is to protect surface waters and ground waters of the state from pollution sources of all types in order to provide suitable water quality for all beneficial uses. The numerous responsibilities of the Board can be summarized into four basic programs:

1) Local Assistance: Grants for Clean Water
2) Water Quality Planning
3) Waste Discharge Requirements and Enforcement
4) Water Rights.

Under the Local Assistance program the Board administers the Clean Water Grant Program which provides state and federal funds for upgrading, expanding and consolidating waste treatment plants to meet minimum state and federal requirements.

The Board is the state lead agency for water quality planning efforts mandated by both state and federal laws. The Board develops basin plans which set water quality objectivies and recommends programs to achieve the objectives on a basinwide basis. The Board also provides assistance to designated local planning agencies in the development of areawide waste management plans.

The Board, in coordination with the Regional Water Quality Control Boards, issues waste discharge requirements to all dischargers who affect water quality, including both surface and ground waters. The Board administers a surveillance and monitoring program which checks for compliance, conducts aerial surveillance and coordinates data from other state and federal agencies. The enforcement activities include issuance of administrative cleanup orders and/or referral to the Attorney General for court action.

Under its Water Rights Program the Board processes applications for use of unappropriated water in California. The Board also conducts adjudications of water use, as a part of its water rights process, and by request of the courts. In addition, the Board records water extractions and diversions in Riverside, San Bernardino, Los Angeles, and Ventura Counties.

B. Workforce Profile

The California State Water Resources Control Board is staffed with a total of 496 professional/technical positions and 190 clerical positions. The following table provides a breakdown of the professional/technical positions by occupational type.

TABLE XXII

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

Staffing Level (1976)

Position	1976
Administrative	65
Biologist	54
Engineer	278
Engineering Technician	30
Analyst	53
Attorney	15
Other	1
TOTAL	496

The Other category represents an operations specialist. The administrative category includes state and regional board executive officers, division chiefs, their assistants, regional administrative officers, business service officers and their assistants. The Analyst category includes all statistical processing, governmental program staff services, personnel, budget, and similar such programs.

The State Water Resources Control Board as a central administrative branch and five administrative divisions. The five divisions are: the legal division, the consolidated administrative services, the division of water quality, the division of planning and research, and the division of water rights. In addition to the five divisions, the Board has nine regional offices. The staffing for these divisions and regional offices is as follows:

TABLE XXIII

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

Staffing by Branch (1976) est.

Branch	1976
Executive Branch	27
Legal Division	36
Consolidated Administrative Services	75
Division of Water Quality	126
Division of Planning and Research	70
Division of Water Rights	54
North Coast Region	17
San Francisco Bay Region	40
Central Coast Region	18
Los Angeles Region	44
Central Valley Region	53
Lahontan Region	16
Colorado River Basin Region	14
Santa Ana Region	18
Santa Diego Region	15

Position vacancies are filled through the state Civil Service System.

During 1976, the State Water Resources Control Board has made great strides toward complying with PL 92-500. Much of the first phase of the Federal Act has been implemented: water quality control plans have been adopted for all areas of the state and NPDES permits specifying 1977 levels of required treatment have been issued to all surface water discharges. Eight 208 Planning grants were awarded in the state. Grant recipients included the State Water Resources Control Board and seven regional agencies. The following is a list of the seven 208 primary planning agencies:

1) Association of Bay Governments, Berkeley;
2) Assoiciation of Monterey Bay Area Governments, Monterey;
3) Comprehensive Planning Organization of San Diego County, San Diego;

4) Sacramento Regional Area Planning Commission, Sacramento;
5) Southern California Association of Governments, Los Angeles;
6) Tahoe Regional Planning Agency, South Lake Tahoe;
7) Ventura Regional County Sanitation District, Ventura.

With the exception of the Tahoe Regional Planning Agency, the 208 Planning programs in these agencies will operate through 1978. The Tahoe Program has been operational for two years, and is currently operating on a six month program extension.

The following table represents the cumulative number of employees in these agencies that are directly involved with 208 Planning.

TABLE XXIV

STATE OF CALIFORNIA

Section 208 Planning Agencies
Staffing Level (1976)

Position	1976
Engineer	21
Attorney	6
Planner	19
Conservationist	1
TOTAL	47

The local agencies have made contract awards to other municipal agencies. These agencies have estimated that an additional 73 persons may be employed under these contracts. These positions represent varied environmental disciplines.

There are two state analytical laboratories which have responsibility for aspects of water quality analysis: the state analytical laboratory for the California Department of Fish and Games and the Marine Bio Assay

Laboratory. These two laboratories have similiar responsibilities which include:

1) determination of cause and effect of pollutants and toxic substances on fish and wildlife;

2) provision of technical assistance to persons in the field in the prevention and solving of problems related to the impact of pollutants and toxic substances upon fish and wildlife;

3) conducting research on special problems regarding toxic substances effects upon fish and wildlife.

In general, the Fish and Game Laboratory focuses its program efforts upon inland streams and waters, while the Marine Bio Assay Laboratory is concerned with ocean and estuary habitats. The Marine Bio Assay Laboratory is currently staffed with 21 professionals: 15 field wardens and 6 biologists. The Fish and Game Laboratory has a total staff of 12: 1 administrator, 1 special project coordinator, 4 chemists, 3 biologists, 2 technicians, and 1 secretary. Turnover at both laboratories is minimal. The Marine Bio Assay Laboratory has no turnover. This is correlated with general satsifaction with job realted activities and working conditions. The Fish and Game Laboratory has a turnover of no more than one person per year. As with the Bio Assay Laboratory, the Fish and Game Laboratory attributes its low employee turnover to general job satisfaction. New employees are recruited through the State Personnel Office.

Wastewater training programs are offered at numerous locations throughout the state. The most prominent program is available through the San Marcos Training Center. The Center is staffed with a director, two training coordinators, an instructor on loan from Palomar College, a supervision plant operator, and a secretary. Comprehensive training programs are also offered through five community colleges: Orange Coast, Santa Ana, Contra Costa, Sacramento City, and Sierra. There are total of nine instructors involved with training at these programs. While other colleges within the state offer sporadic training programs, no information is available on the number of persons involved with the programs.

There are approximately 735 municipal wastewater treatment plants in the state. Municipal wastewater treatment plants are classified into five categories:

1) Class I - Plants having stabilization ponds and using primary treatment with a Design Flow of 1.0 MGD or less.
2) Class II - Plants using extended aeration, primary treatment with a Design Flow of greater than 1.0 MGD or less than 5.0 MGD or biofiltration of 1.0 MGD or less.
3) Class III - Plants having primary treatment of 5.0 MGD to 20.0 MGD, biofiltration of 1.0 MGD to 10.0 MGD, activated sludge of 5.0 MGD or less or tertiary treatment of 1.0 MGD or less.
4) Class IV - Plants having primary treatment of greater than 20.0 MGD, biofiltration of 10.0 MGD to 30.0 MGD, activated sludge of 5.0 MGD to 20.0 MGD, or tertiary treatment of 1.0 MGD through 10.0 MGD.
5) Class V - Plants having biofiltration treatment of greater than 30.0 MGD, activated sludge of greater than 20.0 MGD, and/or tertiary treatment of greater than 10.0 MGD.

There are an estimated 250 Grade I, 210 Grade II, 200 Grade III, 50 Grade IV, and 25 Grade V plants.

A total of 7,655 persons are employed in municipal wastewater treatment systems. Of these employees, 4,000 are operators: 398 line maintenance/ uncertified operators, 870 Grade I, 1,160 Grade II, 730 Grade III, 361 Grade IV, 181 Grade V, and 300 Operators in Training. The remaining 3,655 employees include administrators, chemists, and maintenance persons.

Turnover in the Class I systems is relatively high with an average annual turnover rate of 15%. The Class II systems experience an estimated 10% per annum turnover. The Class III and IV systems have reasonably stable staffs; the average annual turnover is approximately 5 percent. The Class V systems have minimal turnover with an estimate of 2% or less per year. The turnover in the lower plant classifications is an indication of upward mobility. Many of the operators, once they become trained and have gained the requisite experience, can obtain higher paying jobs at upper level plants.

There are an estimaed 750 direct industrial dischargers within the state. Of these dischargers, the most prominent sources are the oil manufacturers and canning industries. The oil manufacturers are concentrated in the San Francisco Bay area and near Los Angeles. The canning industries figure prominently in the San Joaquin Valley and Fresno area. Of the 750 dischargers, about 250 operate supervised treatment plants. The state does not operate a classification system for industrial waste treatment plants. No specific information is readily available on the number of employees in the industrial waste treatment system;

however, it is estimated that the plants are frequently operated by a crew of two to three employees. The crew is generally composed of one supervisor and one or two operators. Turnover within the industrial wastewater treatment facilities is considered to be minimal.

C. Workforce Projections

Over the next five years, it is estimated that the California State Water Resources Control Board will increase its staffing by not more than 1% annually. This growth will reflect expansion of staff to address increased service demands. No amplification of existing programs is planned. The following table depicts the growth of the Board by occupational type:

TABLE XXV

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

Workforce Projections to 1982 (est.)

Positions	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Administration	65	65	67	68	70	70	1%	2%
Biologist	54	55	56	57	58	60	1%	1%
Engineer	278	281	283	286	289	292	5%	1%
Engineering Technician	30	31	32	33	34	35	0	3%
Analyst	53	53	54	54	55	56	1%	1%
Attorney	15	15	15	16	16	17	1%	1%
Other	1	1	1	1	1	1	0	0
TOTAL	496	501	508	515	523	531	n/a	1%

The clerical support staff will continue to grow at the same rate as the professional and technical staff. The 190 clerical positions will be increased to 199 by 1981. The growth approximates 1% per annum.

The future status of the state and local 208 planning effort is considered as tentative. Through 1978, the staffing levels of the programs will remain stable. Between 1979 and 1981, continued staffing of the planning programs will be entirely dependent upon local funding. It is not likely that local communities will be able to fund large-scale planning programs without additional federal assistance.

Growth within the Marine Bio Assay Laboratory and the California Department of Fish and Games will be limited during the next five years. The directors of the laboratories were hesitant to make any future staffing projections. They indicated that future expansion of their programs will generally be related to availability of funds through grants and contracts. They were unable to state what types of grants and contracts they would be considering.

The San Marcos Training Center will be adding a staff position during 1977. The Center proposes to hire an assistant coordinator for the new mobile lab. Other than this one position, the Center was hesitant to project any other staff increases during the next five years. Turnover within the Center is minimal, with an average of one person leaving each year. As vacancies occur, advertisements are placed in national professional journals. Referrals are also accepted through professional organizations.

The private sector workforce requirements will grow steadily during the next five years. The following table illustrates the anticipated growth by occupational type.

TABLE XXVI

STATE OF CALIFORNIA

Municipal Wastewater Treatment Plant Operators Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Operator								
Grade I	870	930	973	1,015	1,058	1,100	15%	5%
Grade II	1,160	1,160	1,173	1,232	1,291	1,350	10%	3%
Grade III	730	730	730	734	767	800	5%	2%
Grade IV	361	361	361	387	419	450	5%	4%
Grade V	181	190	211	232	253	275	2%	9%
In-Training	300	412	459	506	553	600	n/a	15%
Maintenance/ Uncertified	398	398	398	398	398	398	n/a	0
Other*	3,655	3,863	4,130	4,320	4,476	4,632	n/a	5%
TOTAL	7,655	8,044	8,435	8,824	9,215	9,605	n/a	5%

*Other includes administrators, chemists, and maintenance personnel.

The primary factor responsible for growth within the municipal waste treatment plants will be increased demands for service resulting from growth in population.

Growth is anticipated within the industrial sector. It is estimated that staffing requirements for the industrial waste treatment facilities will increase by approximately 5 to 10 percent per annum. This expansion will be related to increased production and to the increased cost of treatment charged to the industries by the local municipalities.

D. Training and Certification

The State of California has a broad based wastewater training program. Programs are available through many of the state community colleges and through the San Marcos Training Center. Courses are available not only for the wastewater treatment plant operator, but also for program administrators, maintenance personnel, grant writers, and safety specialists.

The most comprehensive training program is available through the San Marcos Training Center. The Center is operated by the California State Water Resources Control Board. In 1971, the Board and the Environmental Protection Agency realized that operator training was not being addressed adequately by the existing training program. In response to this need, the Board funded the operation of the San Marcos Training Center. In March 1975, the first class received training.

Facilities at the Center include an administration-classroom building, a 300,000 gallon-per-day activated sludge treatment plant and a mobile laboratory. During 1977, the Center will be adding a second mobile training unit.

The Center currently offers fifty training courses; however, not all fifty courses are available during a given quarter. The Center staff also serve as instructors at local seminars and workshops. In addition, the staff provides technical assistance to local communities in solving wastewater related problems. The enrollment of the Center has experienced a steady growth over the past five years. During 1977, it is estimated that 650 persons will attend programs offered through the Center. The staff will also provide instruction to an additional 2,000 persons through special community seminars and workshops.

During 1976 the following courses were offered:

1) Introduction to Wastewater Mathematics; offered twice during 1976; enrollment 32.

2) Advanced Wastewater Mathematics; offered once during 1976; enrollment 9.

3) Laboratory Analysis: Procedures and Interpretation of Results; offered twice during 1976; enrollment 30.

4) Laboratory Operation/Plant Control; offered ten times during 1976; enrollment 118.

5) Laboratory Mathematics; offered once during 1976; enrollment 8.

6) Plant Evaluation and Assistance for Regulatory Agencies; offered once during 1976; enrollment 15.

7) Wastewater Collection System Maintenance; offered once during 1976; enrollment 15.

8) Phase I. Techniques of Instruction for Personnel Responsible for In-Plant Training; offered once during 1976; enrollment 6.

9) Pump Theory and Operation; offered twice during 1976; enrollment 52.

10) Activated Sludge; offered once during 1976; enrollment 12.

11) Wastewater Treatment Plant Operation, Emphasis: Introduction to Plant Operations; offered twice during 1976; enrollment 31.

12) Wastewater Plant Operations, Emphasis: Activated Sludge; offered once during 1976; enrollment 20.

13) Wastewater Treatment Operations, Emphasis: Lagoons and Oxidation Ponds; offered once during 1976; enrollment 34.

14) Water Quality Biology; offered once during 1976; enrollment 10.

15) Water Grants; offered once during 1976; enrollment 29.

16) Instructor Workshop; offered once during 1976; enrollment 5.

17) Aerial Surveillance/Enforcement Photography; offered once during 1976; enrollment 12.

18) Toxicity Bio Assay Workshop; offered once during 1976; enrollment 12.

19) Mobile Wastewater Technology; offered four times during 1976; enrollment 67.

Enrollment in training programs is expected to grow steadily during the next five years. During 1978-79, the program is expected to experience significant increases as the second mobile laboratory is opened. The Center did not make any estimates on the amount of the expected increase.

Training is also available through five community colleges in the state: Orange Coast, Santa Ana, Contra Costa, Sacramento City, and Sierra. These colleges offer ongoing wastewater and water treatment programs. Cumulatively, these colleges train an average of 650 additional operators annually. A steady growth in enrollment is projected for these courses during the next five years.

Other of the 106 community colleges in the state offer sporadic training programs. No information is currently available on the number of operators trained through these programs.

E. Career Potential

Career opportunties within the state operated wastewater programs will be rather limited during the next five years. All occupations within the California State Water Resources Control Board will grow no more than 1-2% annually. This growth requirement is associated with increased demands for service under existing programs. There will be limited expansion of staff within the state analytical laboratories for the State Department of Fish and Games and the Marine Bio Assay Laboratory. No program diversification is planned, with the exception of the laboratories' efforts to secure special funded projects. Any staff expansion will be a direct consequence of acquiring such projects.

The 208 Planning Projects will remain stable through 1978; however, the future of the programs following the demise of federal funds is tenuous. However, staff members are actively pursuing private sector funding sources.

The municipal wastewater treatment facilities in the state will experience an average annual growth in staffing of about 5%. This growth is attributed to an increase in population and its consequent increase in demands for service.

Upward mobility within the lower classifications of municipal waste treatment plants is strong. The degree of mobility is evidenced by the higher turnover rates in the lower plant classifications and the more stabilized turnover in the Class IV and V plants.

There will be an average growth of from 5 to 10 percent annually in the demand for operators and supervisors in the industrial waste treatment facilities. The demand will be a consequence of muncipalities increasing the charges to industries for treatment of industrial wastes.

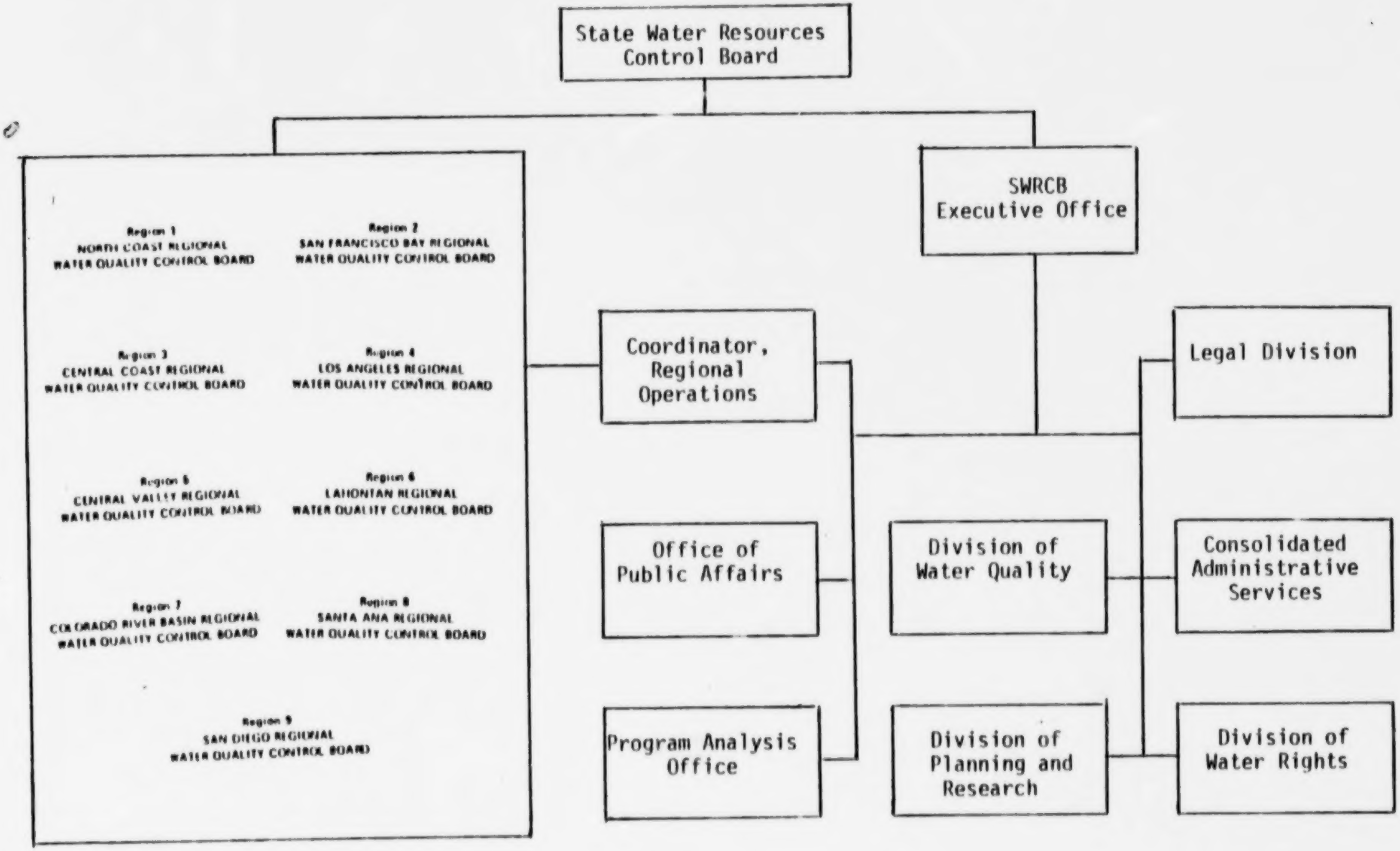
F. Conclusion

During the next five years, the wastewater control workforce within the State of California will experience a significant increase as the state integrates the requirements of P.L. 92-500 into its existing programs structures. This exapansion will assert continuing demands upon the state training programs. Advanced training programs will be needed to educate engineers, geologists, and planners in the fundamentals of wastewater treatment. The community colleges will be asked to train more operators, supervisors, engineering technicians, and maintenance workers.

In conclusion, it is evident that the growth patterns in the wastewater pollution control field are directly related to the requirements of federal legislation, i.e., P.L. 92-500. While there is no apparent emerging legislation in this field, any new legislation introduced during the next five years would certainly alter the workforce projections in that there would be a probable increase in all occupational levels in both the private and public sectors.

Figure 6

WATER RESOURCES CONTROL BOARD
ORGANIZATIONAL CHART


State Water Resources Control Board
SWRCB Executive Office
Legal Division
Consolidated Administrative Services
Division of Water Rights
Division of Water Quality
Division of Planning and Research
Coordinator, Regional Operations
Office of Public Affairs
Program Analysis Office
Region 1 NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD
Region 2 SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD
Region 3 CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD
Region 4 LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD
Region 5 CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD
Region 6 LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD
Region 7 COLORADO RIVER BASIN REGIONAL WATER QUALITY CONTROL BOARD
Region 8 SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD
Region 9 SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

VIII. ENERGY

A. Introduction

With the recognition that energy is essential to the health and welfare of the state and its economy, the California State Legislature enacted the Warren-Alquist State Energy Resources Conservation and Development Act in May, 1974. The Act provided for the establishment of the State Energy Resources Conservation and Development Commission. The Commission is the principal state lead agency for energy program coordination and planning.

The Warren-Alquist Act delegated the Commission the following basic responsibilities:

1) to undertake a continuing assessment of trends in the consumption of electrical energy and other forms of energy and to analyze the social, economic, and environmental consequences of these trends;

2) to carry out or cause to carry out energy conservation measures and make recommendations to the Governor and Legislature concerning new and expanded energy conservation measures;

3) to prepare, with the assistance of electric utilities, gas utilities, fuel producers and wholesalers, and other sources, forecasts of future energy supplies, of future energy or fuel production and transportation facilities to be constructed, and of consumption patterns of all forms of energy;

4) to analyze such forecasts in relation to statewide estimates of population, economic, and other growth factors, and also in terms of the availability of energy resources, costs to consumers, and other factors;

5) to administer, under contract or other arrangements, research and development into alternative sources of energy, improvements in energy generation, transmission and siting, fuel substitution, and other topics related to energy supply, demand, public safety, ecology and conservation;

6) to administer the power facility and site certification program to include adopting standards to be met in designing and operating a facility, prescribing the form and content of application for facilities, evaluation of policies governing the establishment of rates, and serving as a repository for the collection and storage of data and information on all forms of energy supply, demand, conservation, public safety, and related subjects.

These responsibilities have been concisely categorized as Energy Shortage Contingency Planning, Forecast and Assessment, Conservation, Power Facility and Site Certification, and Research and Development.

Under its Energy Shortage Contingency Planning Program the Commission develops plans to deal with possible shortages of energy and fuel supplies. (In developing these plans, the Commission requests that the electric and gas utilities, fuel wholesaler and manufacturer submit information on proposed energy laod curtailment plans or emergency energy supply distribution plans. This information will be used for identifying loads or users in case of sudden interruption or shortage of power.)

The Forecast and Assessment Program requires that all electrical utilities in the state submit a report every two years to the Commission specifying 5-, 10-, and 20-year forecasts on assessments of loads and resources for its service area. The reports include information on the following:

1) estimated peak loads, resources, and reserve margins;

2) existing and needed electrical generating plants and facilities;

3) an estimation of the availability of and cost of fuel resources;

4) a description of projected growth influencing increased demand for electrical energy and the basis for such projection.

The forecasts are reviewed and evaluated according to population growth estimates, land use, transportation, economic development programs and forecasts, the environment, the public health, and the state's economy.

Under the Conservation Program a balanced use of energy is encouraged. The Commission conducts an ongoing assessment of the opportunities and constraints presented by all forms of energy. In addition, studies and research are conducted to assess the supply and demand of energy resources and to reduce non-feasible uses of energy.

By law, the Commission has the exclusive power to certify all sites and related facilities in the state. These certification activities are included under the Commission's Power Facility and Site Certification Program.

The responsibilities of the Commission under its Research and Development Program include developing and coordinating a program in research and development of alternative sources and conservation of energy. The Commission directs research into alternative energy sources of particular interest to California, such as solar, geothermal, and nuclear energy.

B. Workforce Profile

Pursuant to the enactment of the Warren-Alquist State Energy Resources Conservation and Development Act, the governor organized and appointed members to the State Energy Resources Conservation and

Development Commission. The Commission is a five member board subject to appointment by the Governor. The Act stipulates the background and experience of each member:

1) one member of the Commission shall have a background in the field of engineering or physical science and have knowledge of energy supply and conversion systems;
2) one member shall be an attorney and a member of the State Bar of California with administrative law experience;
3) one member shall have background and experience in the field of environmental protection or the study of ecosystems;
4) one member shall be an economist with background and experience in the field of natural resource management;
5) one member shall be from the public at large.

The Secretary of the Resources Agency and the President of the Public Utilities Commission are ex-officio, non-voting members of the Commission.

The members of the Commission are appointed for five year terms. The terms of the members are staggered so that no more than one member of the Commission retires during a given year.

The Executive Office of the Commission consists of nine offices and five divisions. The nine offices include: the Office of the Executive Director, the Office of the Commissioner, the Office of the Secretariat, the Office of Policy and Program Assessment, the Office of Nuclear Program Assessment, the Office of Information and Education, the Office of the Public Adviser, the Office of the General Counsel, and the Office of Governmental Affairs.

The Executive Director's Office provides the information link between the policy board and the executive office. Responsibilities of this Office include the following:

1) to continually evaluate and modify staff programs and priorities to meet the Commission goals;
2) to negotiate and discuss with federal, city, and county governments, and state agencies the successful coordination and implementation of energy programs;
3) to present staff proposals to the Commissioners for review and approval;
4) to meet with members of the public, representatives of various interest groups and utility liaisons to ensure the flow of information regarding current Commission programs;
5) to oversee daily operations of the divisions and the Director's Office staff functions.

The Office of Policy and Program Evaluation has been delegated the following four major areas of responsibility:

1) to analyze and evaluate existing and proposed programs and main projects;
2) to evaluate impacts of state and federal policies effecting production, transportation, processing and use of fossil fuels and other energy sources sand develops policy and program recommendations in areas where the Commission has general energy analysis, planning and advisory responsibilities;
3) to analyze changes or trends in state and federal environmental policies and develops procedures for integrating environmental assessment with policy, planning, and project approval processes;
4) to supervise and integrate the mandated Biennial Report to the Governor and Legislature.

Responsibilities for informing the public of all relevant Commision meetings and hearings is vested in the Office of the Secretariat. Included in its responsibilities are the maintenance of the Master Calendar of Commission activities and a record tabulation of proceedings that terminate in committee or full Commission hearings.

A total of eight nuclear power generating facilities are operational or will be operational by 1982. Cumulatively, the eight nuclear power generating facilities have a potential nuclear generating capacity of 7,606 net megawatts. Six additional nuclear facilities are proposed with a net generating capacity of 7,600 megawatts. To ensure the health and safety of the residents of California, the Nuclear Assessment Program Office has been assigned the following duties:

1) to conduct analyses and investigation into the status of the technologies and federal approvals for nuclear fuel rod reprocessing and disposal of high-level nuclear waste;

2) to perform studies relevant to the feasibility, effectiveness, and necessity for undergrounding or berm containment of nuclear plants;

3) to conduct staff analysis of whether to adopt regulations requiring the nuclear power plants to be either undergrounded or berm contained;

4) to provide technical assistance to the Energy Facility Siting Division to review the factors related to safety and reliability of the facilities at each site designated in a Notice of Intent for nucler power plants.

The Office of the Commissioner consists of the five members of the Commission and the supportive technical staff.

The Office of the Public Advisor ensures that full and adequate participation is secured in all of the programs and proceedings of the Commission. Responsibilities of the Office include implementing measures for participating which include ensuring that timely and complete notice is disseminated to all interested groups and to the public at large; advising such groups and the public as to effective means of participating in the Commission's proceedings; recommending to the Commission additional measures to assure open consideration and public participation in energy planning, site and facility certification, energy conservation, and emergency allocation proceedings.

Legal support for all Commission activities is provided through the Office of the General Counsel. Functions of the Office include participating in the processing of power plant applications; drafting regulations and orders relating to the Commission's statutory obligations in the fields of energy conservation, energy supply and demand assessment, and resource development; analyzing legislation; and representing the Commission before Federal and State Agencies and Boards.

Public awareness and support of Commission programs is essential to the success of the comprehensive energy planning and program process. The Office of Information and Education has as its primary responsibility the preparing and dissemination of summaries, brochures, and news releases to increase public awareness and understanding of Commission activities, policies, and programs. Through the use of media communication techniques, the Office informs the public of upcoming Commission meetings, hearings, and workshops.

The Office of Governmental Affairs coordinates activities, information, legislation, and personal contacts between the Energy Commission and other state agencies, the Legislature, regional, county, and local governments, and other states' energy agencies, federal agencies, Congress and the Administration. The Office apprises Commission staff and the Commissioners of the availability of publications and legislation and the occurrence of meetings, hearings, conferences or personal contacts relating to energy issues and activities of governmental organizations.

The preceding nine offices have a cumulative staffing level of 85.8 persons, which includes: 51 professionals, 25 clerical positions, and 9.8 temporary workers. The following table provides a breakdown of the 51 professional positions by occupational type.

TABLE XXVII

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Administrative Offices
Current (1977) Staffing Level

Position	1977
Administrator	15
Staff Services Analyst	4
Energy Resource Specialist	11
Attorney	16
Other	5
TOTAL	51

The Other category includes two public advisers, one research specialist, one editorial technician, and one information officer.

The five principal divisions of the Commission Executive Office are: the Energy Assessment Division, the Conservation Division, the Energy Facility Siting Division, the Alternatives Implementation Division, and the Division of Administration. Cumulatively, these divisions are staffed with 487 persons: 362 professional/technical positions, 96 clerical positions, and 29 temporary workers. The following table provides a review of the professional and technical positions by occupational type:

TABLE XXVIII

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Program Divisions
Current (1977) Staffing Level

Position	1977
Administrator	31
Staff Services Analyst	57
Energy Resource Specialist	165
Planner	27
Operations Specialist	25
Statistical Analyst	5
Engineer	16
Other	36
TOTAL	362

The Other category includes 1 Accountant, 2 Management Analysts, 2 Budget Analysts, 1 Administrative Analyst, 2 Librarians, 1 Supervisor of Technical Publications, 1 Surplus Property Coordinator, 1 Personnel Analyst, 1 Artist, 1 Data Processing Analyst, 4 Programmer Analysts, 5 Government Program Analysts, 3 Engineering Geologists, 2 Research Specialists, 1 Research Writer, 1 Information Officer, 1 Geologist, 1 Research Manager, 4 Research Analysts, and 1 Land and Water Use Analyst.

The Commission was able to provide a detailed occupational analysis of each of the five divisions. There are 60 persons employed in the Administrative Services Division, 112 in the Energy Assessment Division, 110 in the Facility Siting Division, 72 in the Alternative Implementation Division, 134 in the Conservation Division. The following tables provide a review of the staffing configuration of each division.

TABLE XXIX

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Division of Administrative Services
Current (1977) Staffing Level

Position	1977
Administrator	6
Staff Services Analyst	1
Energy Resource Specialist	2
Management Analyst	2
Budget Analyst	2
Librarian	2
Other	8
TOTAL	23

TABLE XXX

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Alternative Implementation Division
Current (1977) Staffing Level

Position	1977
Administrator	5
Staff Services Analyst	6
Energy Resource Specialist	36
Engineer	1
Other	6
TOTAL	54

TABLE XXXI

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Energy Facilities Siting Division
Current (1977) Staffing Level

Position	1977
Administrator	6
Staff Services Analyst	20
Energy Resource Specialist	35
Planner	25
Engineer	4
Other	2
TOTAL	92

TABLE XXXII

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Conservation Division
Current (1977) Staffing Level

Position	1977
Administrator	7
Staff Services Analyst	20
Energy Resource Specialist	43
Planner	1
Operations Specialist	24
Engineer	7
Other	3
TOTAL	105

TABLE XXXIII

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

Energy Assessment Division
Current (1977) Staffing Level

Position	1977
Administrator	7
Staff Services Analyst	10
Energy Resource Specialist	49
Planner	1
Engineer	4
Operations Specialist	1
Statistical Analyst	5
Research Analyst	4
Programmer Analyst	3
Other	4
TOTAL	88

Sources within the Commission provided the following summary statements concerning the responsibilities for each of the five divisions:

1) Energy Assessment Division: The Division makes independent staff forecasts of electricity demand and critically evaluates utility demand forecasting; analyzes technical, economic, and fuel-related aspects of electric supply; and integrates environmentally-sensitive long-range planning into the Commission's policy and regulation activities.

2) Conservation Division: The Division's policies and programs are designed to eliminate energy waste, improve energy efficiency, reduce the level and rate of energy growth, manage electrical load patterns, and assist other state and local governmental agencies involved in transportation and land-use planning.

3) Energy Facility Siting Division: The certification of electrical generating power plant sites and related facilities is the major responsibility of this Division.

4) Alternatives Implementation Division: The Division is responsible for the Comission alterative energy resource program. The goal of the program is to make available and promote the use of new energy systesm.

5) Division of Administrative Services: The Division porvides all organizational components of the Energy Commission with a full range of administrative, business, and office services required to accomplish the primary responsibilities of meeting the goals of the Commission.

In total, the Commission is currently staffed with 573 positions. This number accounts for 487 persons in the five divisions and 86 staff members in the nine program offices. The Commission was unable to provide information on the turnover rates for the individual occupational types or for the Commission as a whole, Nevertheless, sources at the Commission indicated that they believe that attrition for the Commission was average as compared to other agencies with a similar number of employees. All new employes are recruited through the State Civil Service System.

Comprehensive information on the workforce situation for the private sector is not available. Most utility companies in the state have environmental components. Two of the major utilities in the state were surveyed concerning their environmentally related activities. The two utilities interviewed are Southern California Edison Company and Pacific Gas and Electric Company.

Pacific Gas and Electric Company has a total of 165 full-time employees who perform environmentally related activities. The Company has a designated Environmental Quality Office. The Office was created in an effort to facilitate the coordination of environmental programs and activities. The Office is staffed with a director, four technical specialists, and two secretaries. Four other departments provide major support to the environmental program effort including the Department of Civil Engineering, Arechitectural Section; Siting Division, Department of Engineering Research; and Land Department. The four departments contribute 160 staff persons to the environmental effort. The following table provides a staff breakdown of the Environmental Quality Office and the previously mentioned offices by occupational type.

TABLE XXXIV

PACIFIC GAS AND ELECTRIC COMPANY

Environmentally Related Staff
Current (1976) Staffing Level

Position	1976
Administrator	1
Architect	6
Engineer	85
Biologist	10
Chemist	2
Metalurgist	1
Geologist	1
Health Physicist	2
Nuclear Physicist	1
Programmer	1
Engineering Assistant	1
Laboratory Technician	13
Technical Specialist	4
Clerical	2
Other	35
TOTAL	165

Numerous other departments are fully involved with environmental activities. For example, the Law Department is intensively involved in matters concerning licensing and environmental law; the Mechanical and Nuclear Engineering Department is involved in design of radiation-waste systems for power plants; the Accounting Department is designing accounting systems for research and development and environmental expenditures; the Public Relations Department is involved in communicating to the public the environmental accomplishments of the company; and the Materials Department is involved in procurement of low-sulfur oil. No estimate of environmental workforce commitment for each of these Departments is currently available.

The Company was not able to provide information on turnover rate for each occupation type nor for the company as a whole. However, the Company considers its turnover rate as minimal.

The Southern California Edison Company also has an operable environmental component. Most environmental concerns are handled through the Environmental Planning Department. The Department identifies and evaluates environmental issues, legislation and trends, assesses environmental feasibility of facility plans, prepares environmental impact reports, and recommends and assists in developing environmental objectives, policy, research and development, and related public relations programs. The Department is staffed by 21 persons including a variety of engineering disciplines, a geographer, a geologist, and archaeologist, two biologists, an oceanographer, environmental analyst, and scientist.

In addition to the Environmental Planning Department, four other programs contribute efforts to the environmental program: the Engineering and Construction Department, the Power Supply Department, the Research and Development Department, and the Corporate Communications Department.

The Engineering and Construction Department assists in the development of long-range resource programs and conducts applied research and development of environmental control systems, engages in geologic, hydrologic, and meteorologic engineering studies, monitors environmental effects of generating plans on air and water quality, and provides support in obtaining licensing.

The responsibility for environmental factors in operation of steam and hydro-generating facilities including dams, reservoirs and waterways is under the Power Supply Department. The Research and Development

Department is responsible for activities directed toward the development of new technology responsible to present and future environmental problems. The Corporate Communications Department is the principal source of public information on company environmental policy and actions, and costs for environmental protection. No figures were provided by the Company on the environmental workforce allocations within each of these Departments.

Due to the size of the company, the utility does not maintain records on turnover rate for either the individual occupations or for the company in total. However, the utility estimated that the turnover rate was minimal.

C. Workforce Projections

During the next five years the Energy Resources Conservation and Development Commission is not expected to substantially grow in staffing.

The Commission indicated that the national reorganization of energy programs being conducted by the Carter Administration would have a major influence upon state energy programs during the next five years. However, sources at the Commission indicated that it was premature to speculate on the nature of the impact or on the consequent changes in programs, activities, or workforce requirements.

Significant changes are also projected for the private sector programs. In a report published by the United States Department of The Interior entitled, Projects to Expand Fuel Sources in Western States

(May, 1976), California was noted as having 36 fuel source expansion projects planned: 29 electric power plants, 5 geothermal facilities, and 2 oil refineries. Of the 29 electric power plants planned, 13 will be powered by fuel oil, 6 by nuclear power, 6 by hydro-power, 1 by coal, 2 by geothermal, and 1 yet to be determined. As these expansions become operational, additional staff with diverse environmental expertise will be required. No further estimate is available on the number of persons required or the percent of increase in the total environmental-energy workforce.

D. Training and Certification

There are no certification programs either currently operational or planned for personnel in energy-related environmental fields. Most environmental personnel in the energy field have backgrounds in engineering, economics, biological and physical science, and planning. The traditional programs in each of these disciplines, available through the state universities and colleges, appear to be providing adequate numbers of graduates to meet the emerging workforce requirements.

E. Career Potential

The career opportunities for all levels of occupations in the energy related field appear to be extremely bright. The national reorganization of energy programs will exert a major influence upon state, local, and private sector energy programs. Sources in California indicated that they anticipate major federal support in the energy planning, conservation, and research and development fields. As funds become available to sponsor these programs, numbers of planners, engineers, scientists, economists, and technical support personnel will be required to upgrade existing programs to meet requested federal recommendations and mandates.

F. Conclusion

The foregoing information supports a bright future for the energy related workforce within the State of California. California has been actively pursuing internal solutions to the emerging energy problem. As early as 1974, the State Legislature recognized the need for a coordinated energy planning structure. The promulgation of the Warren-Alquist State Energy Resources Conservation and Development Act in May, 1974 marked the creation of the State Energy Resources Conservation and Development Commission. The Commission, which is currently staffed with 313 persons, is expected to experience major growth during the next five years.

Employment opportunities in the energy/environmental field in the state appear to be numerous. Nevertheless, as the utilities companies are successful in completing the proposed energy expansion plans, environmental/energy occupations will become more in demand.

The national reorganization of energy programs will be the determining factor in the percent of growth of energy programs during the next five years. Sources within the state anticipate a major growth in workforce requirements as greater support becomes available for energy planning, conservation, and research and development. Those occupations most in demand will be engineers, planners, scientists, and economists.

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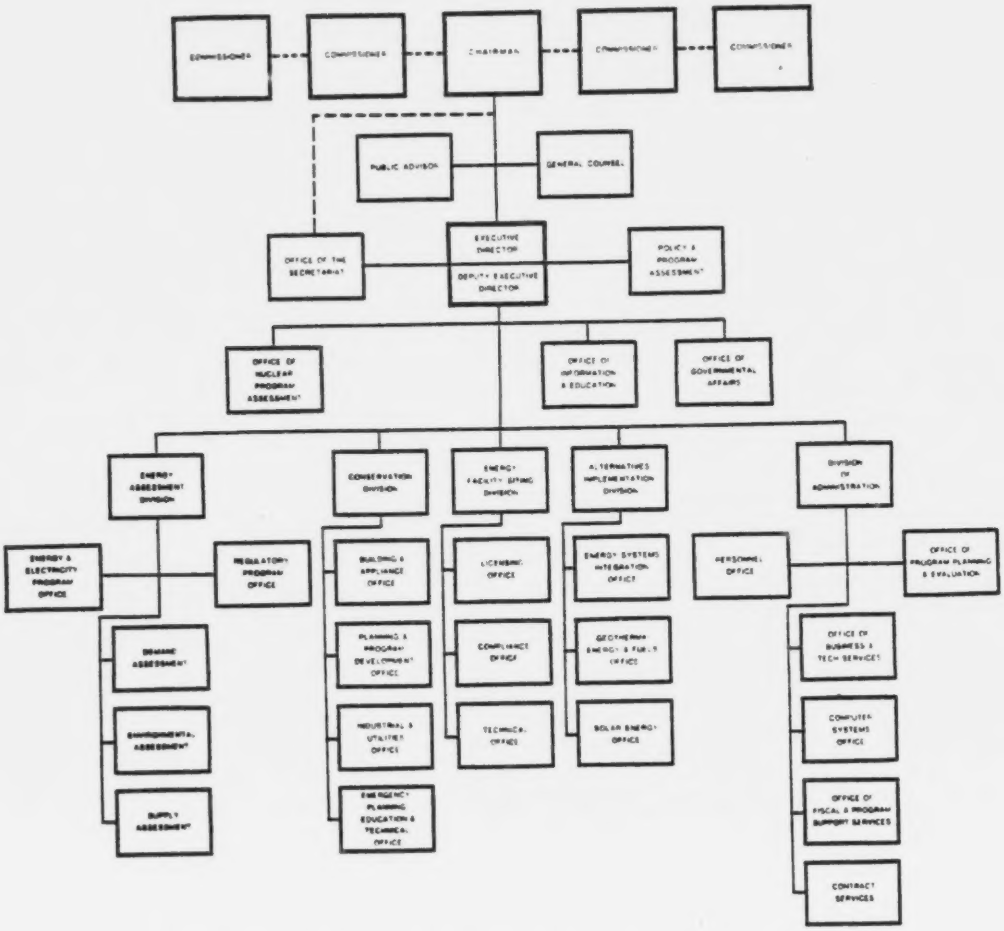
Figure 7

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION ORGANIZATION CHART


COMMISSIONER
COMMISSIONER
CHAIRMAN
COMMISSIONER
COMMISSIONER
PUBLIC ADVISOR
GENERAL COUNSEL
OFFICE OF THE SECRETARIAT
EXECUTIVE DIRECTOR
DEPUTY EXECUTIVE DIRECTOR
POLICY & PROGRAM ASSESSMENT
OFFICE OF NUCLEAR PROGRAM ASSESSMENT
OFFICE OF INFORMATION & EDUCATION
OFFICE OF GOVERNMENTAL AFFAIRS
ENERGY ASSESSMENT DIVISION
CONSERVATION DIVISION
ENERGY FACILITY SITING DIVISION
ALTERNATIVES IMPLEMENTATION DIVISION
DIVISION OF ADMINISTRATION
ENERGY & ELECTRICITY PROGRAM OFFICE
REGULATORY PROGRAM OFFICE
DEMAND ASSESSMENT
ENVIRONMENTAL ASSESSMENT
SUPPLY ASSESSMENT
BUILDING & APPLIANCE OFFICE
PLANNING & PROGRAM DEVELOPMENT OFFICE
INDUSTRIAL & UTILITIES OFFICE
EMERGENCY PLANNING EDUCATION & TECHNICAL OFFICE
LICENSING OFFICE
COMPLIANCE OFFICE
TECHNICAL OFFICE
ENERGY SYSTEMS INTEGRATION OFFICE
GEOTHERMAL ENERGY & FUELS OFFICE
SOLAR ENERGY OFFICE
PERSONNEL OFFICE
OFFICE OF PROGRAM PLANNING & EVALUATION
OFFICE OF BUSINESS & TECH SERVICES
COMPUTER SYSTEMS OFFICE
OFFICE OF FISCAL & PROGRAM SUPPORT SERVICES
CONTRACT SERVICES

Selected Post Secondary Institutions With Formal Environmental Energy Programs

Environmental education programs are offered in a number of state universities, colleges, community colleges and technical schools. Advanced degree programs are offered through the University of California at Berkeley, the University of California at Irvine, California State University at Sacramento, California State University at San Jose, and Stanford University.

The University of California at Berkeley offers M.S. and Ph.D. degrees in Sanitary Engineering. Courses are available in water, wastewater, solid waste, and air. The University of California at Irvine offers two advanced degrees in Environmental Engineering, specifically M.S. and PH.D. degrees. Select courses are offered in the study of air, water, and wastewater pollution control as well as in noise abatement and control.

California State University at Sacramento offers an M.S. degree in Civil Engineering. A variety of courses are available in water resources, air quality management, and solid waste management. An M.S. degree is Environmental Engineering is awarded by the California State University at San Jose. Basic courses are available in water resources, air pollution control and solid waste.

Stanford University has a fully developed Environmental Engineering program with both M.S. and Ph.D. degrees available. Numerous courses are offered in the areas of noise, air, water, wastewater, and planning.

Numerous community colleges in the state offer environmental education programs. The most fully developed environmental education programs are the potable water and wastewater treatment plant operator training programs. Five community colleges in the state offer ongoing training in both water and wastewater. The five colleges are Orange Coast, Santa Ana, Contra Costa, Sacramento City, and Sierra. Other community colleges in the state offer individual courses on a limited basis.

The California State Water Resources Control Board sponsors a wastewater treatment facility, the San Marcos Training Center. The Center, which has been operating since 1971, offers training programs for operators, administrators, grant writers, maintenance personnel, safety specialists, and other persons involved with all facets of wastewater treatment systems.

An indepth analysis of program offerings available through the San Marcos Training Center and California State University in Sacramento is provided in the following section.

SENIOR INSTITUTIONS

California State University
Sacramento, California

Program: Civil Engineering with Environmental Concentration (B.S.)

Hours required for major: Semester - 126
Program Inception: 1958
Staff Size: Eleven professors, three associate professors (14 Ph.D.)
Enrollment: 102
Graduates (1976): 44
Placement: 36
Graduate Work (M.S.): 4

Program: Civil Engineering with Environmental Concentration (M.S.)

Hours required for major: Semester - 30 with qualifying prerequisite degree
Program Inception: 1968
Staff Size: Two professors, one associate professor (3 Ph.D.)
Enrollment: 56
Graduates: 12
Placement: 12
Graduate Work: 0

Courses

Water Resources Engineering
Intermediate Hydraulic Theory
Sanitary Engineering
Water Quality Analysis
Water Quality Engineering Design
Urban Engineering
Atmospheric Pollution Control
Environmental Engineering
Systems Analysis
Water Quality Management and Control
Environmental Quality Treatment Procedures
Water Quality Unit Operation and Procedures
Advanced Water Quality Analysis
Solid Waste Management
Hydrology
Hydraulic Theory
Hydraulic Theory
Resource Planning
Engineering Statistics
Operations Research

Environmental Quality Management
Remote Sensing of Environmental Quality
Air Quality Measurements
Atmospheric Aerosols
Incineration, Air Pollution and Waste Disposal
Combustion
Sanitation Microbiology
Meteorology
Meteorology Laboratory
Physical Chemistry
Instrumental Technology
Environmental Impact Reports
Environmental Internship
Environmental Economics

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

San Marcos Training Center
San Marcos, California

Program: Continuing Education Programs with emphasis in wastewater technology

Hours required for degree: Non-degree programs; offered on an individual basis.

Program Inception: varied
Staff Size: Two instructors (2 M.S.)

Courses

Introduction to Wastewater Mathematics
Hours required: 35
Enrollment: 32

Advanced Wastewater Mathematics
Hours required: 35
Enrollment: 9

Laboratory Analysis: Procedures and Interpretation of Results
Hours required: 40
Enrollment: 30

Laboratory Operation/Plant Control
Hours required: 40
Enrollment: 118

Laboratory Mathematics
Hours required: 35
Enrollment: 8

Plant Evaluation and Assistance for Regulatory Agencies
Hours required: 35
Enrollment: 15

Wastewater Collection System Maintenance
Hours required: 20
Enrollment: 15

Phase I. Techniques of Instruction for Personnel Responsible for In-Plant Training
Hours required: 35
Enrollment: 6

Pump Theory and Operation
Hours required: 18
Enrollment: 52

Activated Sludge
Hours required: 35
Enrollment: 12

Wastewater Treatment Plant Operation, Emphasis: Introduction to Plant Operation
Hours required: 35
Enrollment: 31

Wastewater Plant Operations, Emphasis: Activated Sludge
Hours required: 35
Enrollment: 20

Wastewater Treatment Operations, Emphasis: Lagoons and Oxidation Ponds
Hours required: 35
Enrollment: 34

Water Quality Biology
Hours required: 18-24
Enrollment: 10

Water Grants
Hours required: 12
Enrollment: 29

Instructor Workshop
Hours required: 12
Enrollment: 5

Aerial Surveillance/Enforcement Photography
Hours required: 18
Enrollment: 12

Toxicity Bio Assay Workshop
Hours required: 18
Enrollment: 12

Mobile Wastewater Technology
Hours required: 40
Enrollment: 67

Courses - Courses available but not offered during 1976

Wastewater Treatment Hydraulics
Wastewater Treatment Hydraulics (Advanced)
Industrial Waste Control and Management
Industrial Waste Control for Regulatory Agencies
Wastewater Treatment Plant Safety

Supervisory Training, Public Relations
Public Relations for the Water Quality Control Opeator and Supervisor
Communications and Public Relations for Regulatory Agencies
Laboratory Analysis and Bacterial Examination of Wastewater
Laboratory Analysis and the Characterization of Wastewater Constituents
Budget Preparation
Effects on Receiving Water Quality and Marine Biology Related to Ocean Outfalls
Sedimentation
Activated Sludge
Trickling Filtration
Chlorination/Disinfection
Anaerobic Digestion
Chemical Coagulation and Flocculation
Chlorine Safety
Anaerobic Digestion
Waste Treatment Ponds
Wastewater Treatment Plant Operations
Plant Operation Training in Center Facility
Biological Loading and Troubleshooting
Wastewater Plant Operations, Emphasis: Hydraulically Overloaded Facilities
Wastewater Treatment Plant Operations, Emphasis: Trickling Filtration
Wastewater Plant Operations, Emphasis: Sludge Treatment and Disposal
Wastewater Plant Operations, Emphasis: Chemical Coagulation and Flocculation
Wastewater Plant Operations, Emphasis: Calculations Involved with Each Unit Process
Advanced Wastewater Treatment Technology
Elementary Water Quality Biology
NPDES Compliance Monitoring Workshop
Clean Water Grants Program

State Legislation

CALIFORNIA GENERAL

TITLE:

Environmental Quality Act of 1970
California Public Resources Code 21000

PURPOSE:

To develop and maintain a high-quality environment, and to provide for the state regulation of activities in such a manner as to prevent environmental damage.

DEFINITIONS:

1. Environment
2. Environmental impact report
3. Local agency
4. Public agency
5. Project
6. Person
7. Lead agency

ADMINISTERING AUTHORITY:

Office of Planning and Research
All State and Local Governmental Units

AUTHORIZATIONS:

To adopt environmental impact report (EIR) procedures;
To develop EIR evaluation guidelines;
To prepare and submit an EIR for all projects which may have a significant environmental effect.

PROHIBITED ACTS:

To request or authorize funds for projects failing to comply with EIR requirements.

EXEMPTIONS:

Actions and projects controlled by other environmental impact requisites; emergency projects.

CALIFORNIA AIR

TITLE:

Air Pollution Control Laws
California Health Code 39000

PURPOSE:

To provide for safeguarding the physical environment of the state through on intensive, coordinated effort to protect and enhance the ambient air quality of the state.

DEFINITIONS:

1. Agricultural burning
2. Air basin
3. Air contaminant
4. Ambient air quality standards
5. Bay district
6. Bay district board
7. Bus
8. Certification
9. Certified device
10. Combustible solid waste
11. Commercial vehicle
12. County district
13. County district board
14. Crankcase emissions
15. District
16. District board
17. Emission standards
18. Exhaust device
19. Exhaust emissions
20. Flue
21. Fuel evaporative loss emissions
22. Fuel systems
23. Heavy duty
24. Implement of husbandry
25. Light duty
26. Limited-production vehicle
27. Local authority
28. Model year
29. Motor vehicle
30. Motor vehicle pollution control device
31. Motorcycle
32. New vehicle
33. Nonvehicular source
34. Open outdoor fire
35. Orchard or citrus grove heater
36. Passenger vehicle
37. Person
38. Racing vehicle
39. Regional district
40. Regional district board
41. Schedule
42. Solid waste dump
43. State board
44. Truck
45. Truck tractor
46. Unified district
47. Unified district board
48. Used vehicle
49. Vehicle
50. Vehicular sources

ADMINISTERING AUTHORITY:

Air Resources Board
Resources Agency
Air Pollution Control Districts

AUTHORIZATIONS:

To issue regulations pursuant to the act regarding ambient air quality standards;
To develop a state implementation plan;
To limit air emissions to attain higher air quality;
To conduct air pollution research;
To divide the state into air basins and supervise local air pollution control districts;
To secure air pollution data through monitoring;
To administer air pollution funds;
To provide motor vehicle air emission standards;
To issue permits for air contaminant discharges.

PROHIBITED ACTS:

To discharge air contaminants in violation of ambient air quality standards;
To engage in open, nonagricultural burning;
To fail to comply with vehicular emissions standards.

EXEMPTIONS:

Certain allowed fires and agricultural burning, cooking fires;
Livestock operation odors;
Vehicles and certain non-commercial items (from permit requirement);
Racing vehicles and motorcycles (from motor vehicle emissions standards).

PENALTIES:

Violations are misdemeanor;
Willful violations - civil penalty of fine up to $6,000.
Motor vehicle emissions - fines of up to $50 per vehicle.

CALIFORNIA NOISE

TITLE:

Noise Control Act of 1973
California Statutes, Section 46000

PURPOSE:

To provide for effective coordination of noise control activities to provide an environment free from noise that jeopardizes health or welfare.

DEFINITIONS:

1. Local agency
2. Noise
3. Office
4. Public agency
5. State agency

ADMINISTERING AUTHORITY:

Office of Noise Control

AUTHORIZATIONS:

To undertake noise control studies and effects;
To assist in local noise ordinance preparation;
To monitor noise levels;
To develop standards for noise-producing objects in the state;
To cooperate with federal agencies in noise area.

CALIFORNIA PESTICIDES

TITLE:

California Agricultural Code
California Statutes 11401

PURPOSE:

To provide for a comprehensive system of pesticide and pesticide applicator control through registration and certification.

DEFINITIONS:

1. Agricultural pest control
2. Advisor
3. Agricultural use
4. Commissioner
5. Environment
6. Judgement
7. License
8. Operator
9. Pest Control
10. Pest control operation
11. Pesticide
12. Pesticide dealer
13. Registrant
14. Recommendation

ADMINISTERING AUTHORITY:

Department of Agriculture
Agricultural Pesticide Advisory Committee

AUTHORIZATIONS:

To enforce pesticide safety and registration requirements;
To issue regulations pursuant to the act;
To license agricultural pest control applicators, pesticide dealers, and control advisors;
To classify pests, pesticide, and pesticide users;
To establish certification standards.

CERTIFICATION OR LICENSING:

Dealers, advisors and applicators must show qualifications to be licensed. Can qualify for categories which are established. County registration is also required.

PROHIBITED ACTS:

To engage in activity as dealer, advisor or applicator without proper license;
To fail to comply with all regulations of the act;
To fail to keep necessary records.

EXEMPTIONS: Structural pest control operators.

CALIFORNIA POTABLE WATER

TITLE:

Water Systems and Operators Law
California Health Code 4026

PURPOSE:

To ensure the safety of public water supplies and to provide for operator certification of such facilities.

DEFINITIONS:

1. Reservoir
2. Public agency
3. Advisory Committee
4. Certificate
5. Operator
6. Water treatment plant

ADMINISTERING AUTHORITY:

Department of Health
Advisory Committee on Certification

AUTHORIZATIONS:

To formulate rules and standards for domestic water supplies;
To undertake testing and sampling activity of water supplies;
To provide for customer notification of poor water quality;
To certify operators of water treatment plants;
To establish and assist in filling educational standards;
To classify water treatment facilities.

CERTIFICATION OR LICENSING:

All water system operators must be certified in classification corresponding to the facility; provision to waive examination for existing operators.

PROHIBITED ACTS:

To operate a water treatment facility without properly certified operator;
To engage in operator activity without proper certification.

CALIFORNIA RADIATION

TITLE:

Radiation Control Law
California Health Code 25800

PURPOSE:

To provide for the regulation of sources of ionizing radiation for the protection of public health and safety.

DEFINITIONS:

1. Secretary
2. Ionizing radiation
3. Person
4. Byproduct material
5. Source material
6. Special nuclear material
7. General license
8. Specific license
9. Registration

ADMINISTERING AUTHORITY:

Resources Agency

AUTHORIZATIONS:

To license byproduct, source, and special nuclear materials;
To issue regulations concerning the control of radiation sources;
To collect information on ionizing radiation sources;
To develop standards for issuance of general and specific licenses;
To enter into agreements with state and federal agencies;
To issue emergency radiation orders.

PROHIBITED ACTS:

To manufacture, produce, use or possess any radioactive or similar materials without a proper license.

PENALTIES:

Fines of up to $500 or 180 days in jail.

NRC AGREEMENT STATE: Yes

CALIFORNIA SOLID WASTE

TITLE:

Solid Waste Management and Resource
Recovery Act
California Statutes, Section 66700

PURPOSE:

To establish and maintain a comprehensive solid waste management and resource recovery policy to manage solid waste so as to protect public health, safety, and well-being, to preserve the environment, and to provide for the maximum reutilization and conversion for other uses of resources contained therein.

DEFINITIONS:

1. Board
2. Council
3. Department
4. Disposal facility
5. Disposal site
6. Enforcement agency
7. Hazard
8. Operator
9. Person
10. Pollution
11. Processing
12. Regional planning agency
13. Resource recovery program
14. Solid waste
15. Solid waste disposal
16. Solid waste facility
17. Solid waste handling
18. State policy
19. Transfer/processing station

ADMINISTERING AUTHORITY:

Solid Waste Management Board
Department of Health

AUTHORIZATIONS:

To formulate and adopt state policy for solid waste management, including standards for solid waste handling, disposal and reduction of pollution;

Counties to prepare local solid waste management plan consistent with state policy;
To administer federal funds in the area;
To provide technical assistance to local agencies;
To administer permit program for solid waste facilities.

PROHIBITED ACTS:

To establish solid waste sites not in conformance with solid waste plans and policies;
To operate solid waste facility without proper permit.

EXEMPTIONS:

Nonprofit recycling groups

CALIFORNIA WASTE WATER

TITLE:

Porter-Colgne Water Quality Control Act
California Water Code 13000

PURPOSE:

To provide for the conservation, control and utilization of water resources of the state; and to protect and enhance the water quality of the state.

DEFINITIONS:

1. State board
2. Regional board
3. Person
4. Waste
5. Waters of the state
6. Beneficial uses
7. Quality of the water
8. Water quality objectives
9. Water quality control
10. Contamination
11. Pollution
12. Nuisance
13. Reclaimed water
14. Citizen or domiciiary
15. Liquid waste

ADMINISTERING AUTHORITY:

Waste Resources Control Board
Resources Agency
Regional Water Quality Control Boards

AUTHORIZATONS:

To act as the state lead agency in water pollution matters;
To develop a state policy for water quality control;
To conduct water pollution research and investigations;
To administer a permit program for water discharges;
To classify waste water treatment facilities for operator certification;
To adopt water discharge requirements;
To control liquid waste hauling and disposal.

PROHIBITED ACTS:

To discharge wastes into waters of the state without a permit;
To fail to file necessary reports;
To discharge any radiological, chemical, or biological warfare agent into waters of the state;
To cause or contribute to water pollution;
To violate other provisions or rules of the act.

PENALTIES:

Violations constitute misdemeanor; fines of up to $6,000 and $10,000.